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ABSTRACT

This report is designed as a guide for the production of science books for primary children. Section I contains presentations on the topic of how to produce primary science books, including: an essay on the development of physics theories, the roles of science books, editing science textbooks for primary schools, editing photographic science books and Kamishibai, science experiment kits and teaching aids of Gakken, editing scientific picture books, and the results of a workshop on producing science books. Section II covers problems and solutions that have been identified in Asian and Pacific countries. Section III examines the present situation of science books for children and action plans to develop science book publishing in Asia and the Pacific. The appendices contain general information: a list of participants, lecturers, and secretariat members; and information on the Japanese Children's Science Book Centre in the Suginami Ward Central Library, and the Wakaba Science Club. (LZ)

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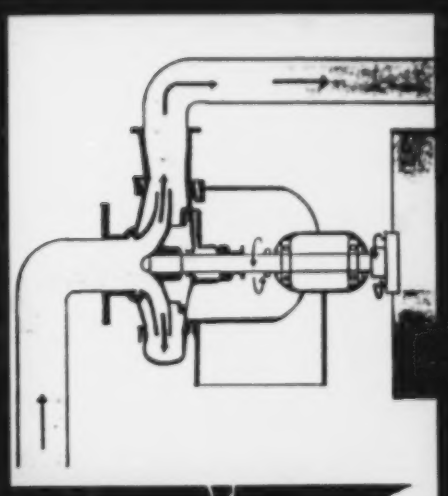

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How to Produce Primary Science Books

Report : 23rd Training Course on Book Production in Asia/Pacific, 1990

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PREFACE

The Training Course on Producing Primary Science Books - 23rd Training Course on Book Production in Asia and the Pacific - was held by the Asian Cultural Centre for Unesco (ACCU), in cooperation with Unesco, Japanese National Commission for Unesco, the Japan Book Publishers Association and the Japanese Board on Books for Young People, from 8 to 27 November 1990.

This regional training course in Tokyo has entered a new phase with its focus on science books for children and in general, in response to the priority of needs and requests of the Member States. Intensive programmes such as lectures/discussions on selected topics on science books, practical workshop session and observations tours were conducted, to provide the participants with necessary knowledge and techniques to make interesting and effective science books for children.

The course had the largest number of participants, 24 from 19 countries, and there were even more who applied for the course. It suggests clearly the urgent needs for training more personnel involved in producing science books such as writers, editors, illustrators and designers. The participants expressed their strong hopes to continue and expand this training course in the future.

We should like to express our deep appreciation and gratitude to all the experts who rendered special contributions to make this course a very substantial one, especially the lecturers and advisers.

We hope this report will be utilized extensively in producing necessary science books for children in greater quality and quantity.

Asian Cultural Centre for Unesco

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I : HOW TO PRODUCE PRIMARY SCIENCE BOOKS

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(1) Who Has Seen The Atom?

Hiroshi Ezawa
Professor, Gakushuin University

1. Introduction

The title of my lecture today is "Who has Seen the Atom?". I have taken this title from that of a book which I wrote in 1976 for our junior readers. After the book was published, I was told that there was a poem by an English poet, Dante Gabriel Rosetti (1828-82) which runs thus:

> Who has seen the Wind
> Neither you nor I.
> But, when the leaves hang trembling
> the wind is passing thro'.

We can say the same for atoms. Atoms are seen only indirectly. It was when a trembling motion of a tiny particle in water was observed that the atoms were recognized to exist. The motion is called the Brownian motion after the English botanist, Robert Brown who discovered it in 1828 (this coincides with the year the poet Rosetti was born). I must add that Brown's discovery did not immediately lead to the recognition of atoms. One had to wait until 1908, when quantitative analysis was made of the Brownian motion by a French chemist, Jean Perrin. In the meantime, facts and evidence were accumulated for the existence of atoms. Thus, it was in 1908, not long ago, that people became convinced of the atomic constitution of matter.

Since then, the progress of science has been enormous, and we say today that we are now living in an atomic age. Perhaps every day we talk about atoms. Yet, we can ask, "Who has seen the atom?" and say, "Neither you nor I."

An atom is a tiny, tiny particle, as you all know. Atoms are so tiny that we can put millions of them, actually 100 millions of them in a row in 1 cm.

Atoms are so tiny that we cannot see them directly. We can touch the atom, but we cannot feel the atom - when we touch anything, we are in fact touching atoms. But, no one can feel individual atoms.

Nevertheless, the atoms are the actors of modern technology. As a matter of fact, the main actors are even smaller; they are called electrons. Electrons run in semiconductors in computers, following faithfully the instructions we give from our keyboard. Our faithful electrons run in TV sets, telephones, lamps, ... in washing machines, cars, trains, and in every machine we conveniently use in our everyday life. But, we cannot directly see the electrons at work.

The same is true for electromagnetic waves, which fly back and forth around us, filling up the space to every corner. If you have any doubt, put a pocket radio any where you like, and you will find it starts singing a song responding to the waves sent out by a broad-casting station in the distance. But, our human body cannot feel the electromagnetic waves at all. Well, not exactly so. Some of the waves in a very small range of wave length can be perceived by our eyes; the visible light is electromagnetic waves of some special wave lengths.

After a long series of researches, scientists now know how to handle electrons, atoms and electromagnetic waves; they now have equipment to detect their behavior; they have equations to predict what they will do next. In science education of today, therefore, we have to teach our youngsters how to deal with those invisible objects.

It was not so when I was a child. The radio set in my family room had vacuum tubes in it. A curious child could open the box to see what was inside. When you turned the switch on, something turned red, red hot in the vacuum tube, and your father would say, "Look, electorns are running away from that red hot wire to travel to the other plate you see up there." "The red hot wire," the child would say, "Something invisible is coming out." Imagination developed. The red hot wire he saw served as a support for him to develop imagination. The father continued. "When the electrons reach the plate, they will flow into the wire connected to it, and the current in the wire drives the speaker. But, there is a grid in between the wire and the plate. This

grid can repel the electrons to keep them from going to the plate. The operation of the grid is controlled by a wave that the radio receives." The child could ask how the grid can repel electrons, how the wave could enter the radio set, ... After asking these how and why questions, the child could imagine what was going on in the radio. He could feel as if he knew how it operates, and moreover he could think that it was within the ability of his own hands to make it.

The radio sets of today cannot be opened, nor the TV sets. If the industry wants to have a continuous supply of scientists in the years to come, they should make radio sets and TV sets in such a way that the box can be opened, safely of course, and that some parts can be replaced for curiosity's sake. Given the sealed box of a TV or a radio the children of today has no clue as to what questions to ask.

When I was a schoolboy, I was a maniac at model plane building, model planes that can fly, being driven by a propeller powered by a bundle of rubber bands. My friends and I, the maniacs, thought we knew why a plane could fly. It is because the wings, the tilted wings push the air down as the plane moves forward. The wings push the air down and the air pushes the plane up. The propeller works in the same way. Thus, the propeller pushes the air backwards and the plane is pushed forwards. The plane is pushed forwards, and then the plane goes and then the wings push the air down and ... You see here a chain of cause and effect, cause and effect, ..., which is the basic form of physical reasoning, or rather of mechanical reasoning. When I was a schoolboy, the world around us was mechanical. We could find many examples which could be accounted for in mechanical terms.

Historically, it was fortunate for Japan to start contact with western science when the mechanical world view dominated, or before it was established. The western science was brought into Japan by missionaries of the Catholic monastic order from Portugal. Francisco de Xavier, one of the founders of the "Societas Jesu" came to Japan in 1549. It was only 6 years after Copernicus published a book on his heliocentric theory. Galileo would be born 15 years later (1564), Descartes 50 years (1596) and Newton 100 years (1642).

2. Newtonian Mechanics

Why do the planets move around the sun? The philosopher Descartes argued from his principle that the universe is filled with fine particles. As the sun rotates, immense vortices are generated in the sea of fine particles; the whirling motion extends outwards eventually to push the planets around their orbits. Fifty years later, Newton came. Newton must have been taught Descartes' theory in his school. After many years of reflections and experiments, he said, "No, the sun does not push the planet forwards, but sideways", and asserted, "The planet keeps going forward by itself. The planet has inertia that keeps it going straight. Thus, the sun has to pull the planet so that it should follow its curved orbit." However, no mention was made of the fine particles nor of any media that transmit the force from the sun to the planet. People were perplexed. They could not but ask, "How is it possible for the sun to pull such a distant objects as the earth?" Newton didn't answer, saying only that he didn't like to make any hypotheses. People could not be satisfied, and said that Newton's theory was not physics, but mathematics. Yet, people had to admit that Newton's mathematics agreed very nicely with the design of Nature and with the experiences of man.

Newtonian mechanics have a predictive power. Given a position and velocity of a planet as a set of initial data at present, at time 't', it can predict how the planet will behave in the future. It is easy to predict the position of the planet at the next instant of time, 't', since we are given the position and velocity at present. But, this next instant cannot be very far in the future, since the velocity of the planet changes. We can go only a small step, say one millionth of a second, towards future in predicting the new position of the planet. Then how do we know the velocity of the planet at the next instant? From the present position of the planet relative to the sun, the law of the universal gravitation tells us how strongly the sun pulls the planet. From the strength and the direction of this force, Newton's law of motion tells us how much the velocity of the planet changes and in which direction, thereby predicting the new velocity of the planet at the next instant of time, 't'. Thus, Newtonian mechanics predicts the new set of data, the position and the velocity, at the next instant of time, making a small step from the present towards the future. The step is small, but the

process can be repeated to predict the position and velocity of the planet after any length of time.

Mother Nature provided a very nice example. In 1682, five years after Newtonian mechanics was completed (publication in 1687 of Newton's "Philosophiae Naturalis Principia Mathematica"), a comet appeared. From the observed data, Newton's young friend, Edmund Halley, predicted that the comet would reappear at the end of 1758. Triumph of Newtonian mechanics! People regretted only that it was after Halley died in 1742 asking his colleagues to search in the sky at the time he predicted; Newton had died even earlier, in 1727. The comet is now called by the named after Halley.

3. Electricity and Magnetism

Nearly 100 years later, Michael Faraday was trying to generate electricity from magnetism. Since Hans Christian Oersted discovered in 1820 that electric current generates magnetism, why not electricity from magnetism - so thought Faraday. After repeated disappointments, Faraday discovered, in 1831, electromagnetic induction. If you put a magnet near a conducting wire, nothing happens. But, move the magnet and you see electric current induced in the wire. The current is induced if you move the wire instead, keeping the magnet at rest. This symmetry would later lead Albert Einstein to the relativity theory. But, we should not be too hasty.

Clark Maxwell tried to put Faraday's discovery together with other people's in a mathematical form, and noticed that they do not fit together; the laws of electricity and magnetism Faraday and other people had discovered were mathematically inconsistent. The inconsistency could be removed just by adding a small term to one of his equations, but the consequence was enormous. The set of equations thus amended indicated that electric and magnetic forces could propagate in space as a wave. If you dip your hand in the quiet surface of a pond and shake it, a wave spreads in a form of beautiful circles. In the same way, if you shake an electric charge, a wave should be generated and propagates in all directions in a form of spheres this time. If the wave meets an electric charge, then the wave pushes the charge first to the right, then to the left, then to the right and so on, thus making the charge oscillate. This is what Maxwell's set of equations predicted. Maxwell noticed further that his set of equations determines uniquely the speed of the wave propagation, and the speed turned out to be exactly the same as the speed of light. "Aha!" he said, "the light wave must be my wave of electric and magnetic forces."

The prediction was right. Heinrich Rudolph Hertz realized in 1888 a very rapid vibration of electric charge, and succeeded in detecting the wave the charge radiated in exactly the same way as Maxwell had predicted 10 years before. Another triumph of mathematics. Indeed, what Maxwell did was to add a term to his equation, not because any experiments forced him to do so, but because he found a mathematical inconsistency when he wanted to put together all the laws of electricity and magnetism which Faraday and his predecessors had discovered.

It was very nice that light waves were understood. "Well, have we really understood it?" one could say. "No." "What is the carrier of the wave?" The wave on the surface of a pond is a wave of water; the carrier or the medium is water. The medium of a sound wave is air. Then, what is the medium of a light wave?

Physicists started studying the property of the medium, which they called "ether". The ether must be everywhere in the universe, since the light from distant stars reach the earth. So, the planets must be swimming in the pool of the ether. Their speed is tremendous. The speed of the earth, for instance, is one hundred thousands km/h, about 100 times as fast as a jet plane. It appears, however, that the planets feel no force of resistance from the ether, so that, they concluded, the ether must be very, very thin. On the other hand, a property of the light wave which physicists call polarization, required that the ether should be like a solid which resists torsion.

An American physicist named Albert Abraham Michelson wanted to verify that the earth is really swimming in the ether by measuring the speed of light on the earth very, very precisely. If the light propagates in the ether with the speed c as Maxwell calculated from his equation, and if the earth is moving in the same direction, then the speed of light as observed on the earth must be smaller than c. Michelson had confidence in the precision of his measuring apparatus but his experiment in

1881 failed to detect the expected difference in the speed of light. Michelson constructed a more sophisticated apparatus with the help of his assistant, Edward William Morley, but the measurement they made in 1887 failed again.

4. Theory of Relativity

Here comes Albert Einstein, who has been pondering about the ether from the days when, at the age of 16, he dreamed of chasing light waves at the same speed as of light itself.

He knew that the laws of Newtonian mechanics hold true on a train, or on a ship, or even on earth provided that these are moving smoothly. In general, it is called the Galilean relativity that if an experimenter is in uniform motion with all of his apparata, he cannot detect the motion of himself. Why Galilei? Well, when Galileo Galilei was claiming that the earth moved around the sun, people could not be convinced; they opposed it saying "If the earth was moving at such a speed, one couldn't be standing on it, houses would fall down, ..." Obviously, they were recalling riding on horseback or on a stagecoach with horses running at full gallop. Galilei pointed out to them that those motions they had in mind were not uniform and that one does not feel the motion of a ship sailing smoothly on a quiet water, insisting that the earth is also moving smoothly. Galilean relativity does not hold for the laws of electromagnetic phenomena, since the laws fix the speed of light c, and the speed of light measured on a ship sailing relative to the ether must be different from that value c. That the Galilean relativity holds for mechanics but not for electromagnetism appeared to Einstein to be a grave inconsistency of physical laws.

"How can we remove the inconsistency?" he asked himself. It did not appear totally impossible because there are some elements of relativity in electromagnetism also, as we have already seen in electromagnetic induction where one cannot tell whether the magnet is in motion or the coil is. Can't one take it also as a manifestation of relativity in electromagnetism that the motion of the earth could not be detected by measuring the speed of light?

"Let us take it." said Einstein in 1905. He meant to say that the speed of light is the same whether it is measured with respect to the ether, or to the moving earth, or to anything else. However, Einstein could not proclaim the constancy of the speed of light without revolutionizing the Newtonian concept of space and time. The only way in which an experimenter standing still relative to the ether and another experimenter moving with the earth or with a spaceship measure the speed of light to be the same is that their scales of time are not the same and their scales of space are not the same. You must have heard that one of twin brothers sent on a space voyage in a fast-moving spaceship will, upon his return to the earth, find his brother much older than he is. This is one of the consequences of Einstein's revolution of space-time concept.

It is interesting that Maxwell's laws of electomagnetism survived intact the revolution of the space-time concept. They look exactly the same whether an experimenter is standing still or moving uniformly relative to the ether. It was Newton's law of motion that had to be modified in accordance with the new space-time concept. This modification had a deep implication, the equivalence of mass and energy, as you all know, with all its far-reaching consequences.

In Einstein's relativity, no experimenter can tell if he is moving relative to the ether or not. Then, does it make sense to talk about the ether? One could say, "Yes, it must be there as the medium for electromagnetic forces." even after Einstein declared in 1905 (in his paper on light quantum) that luminoferous ether is superfluous. But, as the idea of relativity permeated physics, the concept of ether faded away. There remained only mathematical formulae, and no one asks today what the medium for electromagnetism is.

I have to mention another interesting aspect of the relativity theory. The essence of the relativity theory is that all different experimenters in uniform motion relative to each other can draw up equivalent descriptions to a given phenomenon. Their descriptions are not the same, but equivalent to each other, equivalence here meaning "transformable" to each other by a definite rule called Lorentz transformation. The different descriptions are called "representations" and one is required to see substance behind all these representations. This separation into representations and substance was not there in 19th century physics or before, and will be more conspicuous in the quantum theory which I am going to discuss next.

5. Quantum Mechanics

At the end of the last century, there was another stream of physics, arising from a practical need for measuring temperature in furnaces in the steel industry which was growing by leaps and bounds in Germany. The idea was to analyze the colour of the light leaking out through a small hole from the hot inside of the furnace. As you heat iron, for instance, it starts glowing red, turns yellow, and eventually reaches glaring white, so that the colour should in principle tell the temperature. However, the prediction from Maxwell's laws of electromagnetism was totally different: It said that the colour of the heated iron should be independent of its temperature.

To resolve this discrepancy with experiment, Mad Planck introduced the idea of energy quanta. It is to be assumed that the energy of light consists of lumps or quanta whose size is proportional to the frequency of the light in question; the quantum of red light is small and the quantum of blue light is large.

Now, atoms in the heated iron are vibrating, sometimes strongly and sometimes weakly (thermal fluctuation) and an atom can emit a large quantum only when the thermal vibration is strong. But, statistical method as applied to mechanics tells us that the chances for stronger vibration are smaller, so that quanta of the higher frequency are emitted only rarely. To increase the chances, one has to raise the temperature of the iron. Thus, if one assumes quantum constitution of light, then the change in colour of heated iron can be deduced, and agrees with the experiment.

However, Planck didn't know how to reconcile this quantum constitution of light with Maxwell's theory of light waves whose energy should spread over space continuously. He could only hope that some unknown interaction between electron and light would provide a solution.

In 1911, physics was confronted with another difficulty when Ernest Rutherford discovered that an atom has a tiny core in which its positive charge is concentrated. This core is called the atomic nucleus. Since the nucleus is much smaller than the known size of an atom, this size must be accounted for by electron distribution. But, electrons are negatively charged and therefore are attracted strongly towards the nucleus. In order to keep the electrons away from the nucleus, therefore, one has to invoke the centrifugal forces by letting them go around the nucleus. However, the electrons running on circular orbits are nothing but oscillating charges, which radiate electromagnetic waves, thereby draining energy continually. This is an unavoidable conclusion from Maxwell's laws of electromagnetism. The electrons losing energy by radiation gradually fall towards the nucleus, and the atom must eventually collapse. The lifetime of an atom can be calculated by using both Newtonian mechanics and Maxwellian electromagnetism, and turns out to be as short as one hundred millionth of a second! A grave contradiction to the stable existence of atoms.

Another difficulty had been known for decades. It is that the atoms of a given element, hydrogen, oxygen, etc. emit light with definite colour, or more precisely a series of definite colours characteristic to each element. However, if an atom radiates energy continuously according to Maxwell's laws, then the colour of the light must change continuously also, say from red to blue, in contradiction to experiments. This is the problem of line spectra of atoms. In 1884, Johann Jakob Balmer discovered that the series of colours (wavelengths) of the light from a hydrogen atom obey a very simple formula, which would remain a beautiful mystery for decades.

In 1913, two years after the discovery of the atomic nucleus, Niels Bohr dared to combine the difficulties to guess the characteristic features of an atom. He combined the difficulties of the stability of atom, of the line spectra and of the emission and absorption of light quantum. His guesses were:

1. The electron in an atom can go along a selected set of orbits only. On these orbits, electrons do not radiate continuously.

2. An electron on a selected orbit jumps occasionally to another selected orbit radiating (or absorbing) the whole energy difference of the two orbits as one light quantum.

3. The orbits are selected from those satisfying Newtonian equation of motion by applying a condition (quantization condition).

Bohr could invent a quantization condition which leads to the Balmer formula for the hydrogen line spectra. In view of this success, people thought that Bohr must have grasped some truth of atomic structure, but Bohr's quantization condition remained a mystery, where many people tried to dig up a key to the unknown world.

In 1924, Louis de Broglie got a fanciful idea: the light which had been thought to be a wave was found to have a particle aspect, so why should the electron, a particle, not have wave aspect? In terms of the wave aspect of electron, he could give a convincing interpretation to Bohr's quantization condition.

Then, a question arose. In Bohr's scheme, the orbits are primarily set up by employing Newtonian equation for a particle, and then selections are made by applying the quantization condition. If one uses de Broglie's idea for the quantization condition, the electron is treated first as a particle and then as a wave. Annoying dualism!

Stimulated by de Broglie's fancy, Erwin Schrödinger wrote down in 1926 a wave equation for the electron in the hydrogen atom. To his dismay, the energies of Bohr's selected orbits were not reproduced. When he tried again, he hit the mark, but his wave was now a complex number. Nevertheless, everything he calculated with his wave equation turned out right, agreeing with experiments. The successful march of wave mechanics started here.

A question remained and people were said to have sung:

Many things Erwin has calculated
With his wave function.
We wish only to know
How we should picture the wave.

Schrödinger himself thought that the wave is localized and this lump of wave (called wave packet) is what one observes as a particle. But, this interpretation was untenable, because Schrödinger's wave was found to spread in space in a very short time.

Max Born proposed that Schrödinger's wave gives a probability for location of the particle. Namely, it is more likely for the particle to be located in the places where the amplitude of the wave is the larger (the probability is proportional to absolute-value squared of the amplitude. Recall that the amplitude is a complex number).

This interpretation seemed to fit experiments (electron diffraction by crystals) nicely, but turned out eventually to be untenable. In fact, if you send a beam of electrons through two slits, they behave as if they were waves to form interference fringes on a screen behind. If, however, you repeat the experiment with one of the two slits closed, first with the left slit closed and then with the right one closed, and superimpose the patterns electrons form on the screen, the result is not identical with the result of the experiment with both slits open. These experiments show that, when both slits are open, the electrons pass through both simultaneously! Thus, one cannot picture the electrons simply as particles as Born's probability interpretation does. Yet, we have to point out that electrons, when detected on the screen, appear one by one as individual particles.

We are now in the position to discuss the feature of 20th-Century physics-the separation of representation and substance-which we mentioned previously in relation to relativity theory. A standard theory of today says (1) that electrons can be represented either as particles or waves (but in a sense somewhat remote from common sense) and (2) electrons show themselves up as particles or as waves (in common sense) depending on design of experiments. If we use the words, particle and wave, in the sense of our macroscopic world, the electron is like a cylinder, which appear to be a circular disc if viewed from above, and a rectangle if viewed sideways. Neither of these two descriptions provide a complete picture of a cylinder. In the same sense, neither of the two aspects, particle and wave, provides a complete picture of an electron.

We have come to a strange world of quantum mechanics. Quantum phenomena do not admit intuitive interpretation fostered in the realm of mechanical world view. Nevertheless, physicists often find it useful to try to form mechanical interpretations. This point has to be remembered when we discuss education of young people who tend to be attracted to more abstract world picture.

It is my regret that I have to stop here without discussing the problem of unifying relativity theory and quantum mechanics.

(2) The Roles of Science Books

Akihiko Okabe
Science Journalist

Science is 'international' while science books have rather 'national' characteristics reflecting the situation in their respective countries.

Modern science in Europe flourished regardless of state or government. In Japan, however, the major goal in the development of science from the Meiji Restoration in 1868 was to catch up with developed countries in the world. Scientific development was a national interest. The educational system was established to promote it and in a comparatively short time, a certain success was achieved. This was the result of the strong leadership of the state.

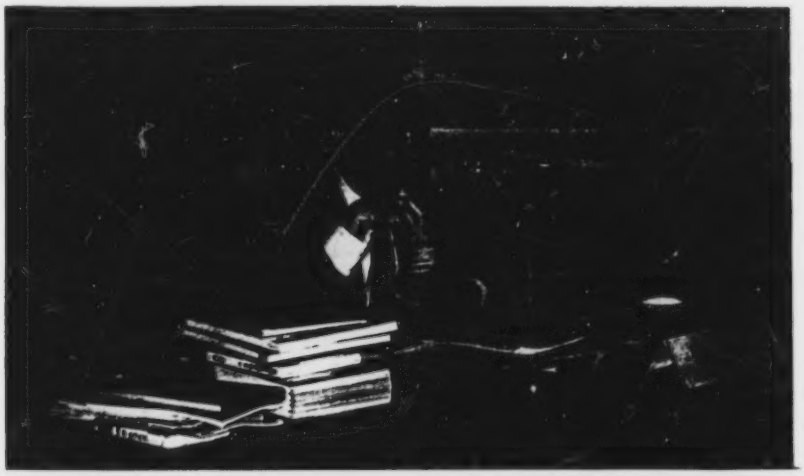
Science education was conducted in line with this national goal. The European system was used as a model of science education and European science books were translated. Science was taught in Japanese and Japan is one of the rare examples in which science education is conducted in the vernacular language rather than English, German, French or Russian. This fact is a direct result of the emphasis on education.

With the popularization of scientific research and science education, the publishing of science books developed. The publishing of science books depends on the existence of a certain population who need them. Such demand was created by the development of education and the growth of industrial technology in Japan. First came textbooks, followed by technical works, introductory works and children's books. Thus the stage was set for Jean Henri Fabre's book to become a nation-wide bestseller.

Science and publishing in Japan faced dramatic change in 1945. Scientific research and education recovered and developed in the midst of economic difficulties.

We will look at the present situation of science books in Japan in its historical viewpoint. The development of science book publishing was a process which covered the last 120 years, including both positive and negative aspects.

I would like to discuss some of the characteristics of science books presently published in Japan showing examples. Also we will look at slides of libraries where these science books are available.



Mr.Okabe is showing a science book for general readers entitled "The Atomic Bomb" which was published 2 months after the Second World War ended.

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(3) Two Ideas on Scientific Books for Children

Shoziro Ishii
Emeritus Professor, Kyoto University

In Japan, nowadays, enormous numbers of books for children are being published, so that even parents and teachers have a hard time selecting a certain book, not to mention young readers. I would like to present my personal opinion on what basis scientific books for children are being planned and published in Japan.

Scientific books may be grouped into two large categories, depending on their titles and contents.

(1) Books on the biographies and scientific achievements of famous scientists, written in quite an educative manner, often by scholars in the specificic field, or by scientific journalists. The readers targeted are elementary to middle level school children.

(2) Books on scientific experiments written by the scientist him/herself. Explanations of the ideas, the processes, and the results of the experiments are explained simply so that children may easily understand. Depending on the contents, this type of book is aimed at on elementary, middle level, or even older readers.

Since the type of scientific books needed depends on the aim of scientific education and the educational environment, there is no question of either type being superior or inferior as regards ideas and planning. In Japan, ever since the Meiji period, most of the scientific books had been type one, their aim being to introduce Western technology into the country. The economic development of present-day Japanese society is the result of the ingenious application to industry of the principles found in the Western countries.

Recently, the importance of basic research work has been stressed and it is desired to apply to industry the newly discovered principles and fundamental rules of science. Therefore, it is also quite important to plan and publish the childrens' scientific books which belong to group two.

Children are naturally full of strong curiosity, and are always ready to ask "why". The development of their curiosity may often lead to discoveries and inventions. It is important for teachers and parents to encourage such curiosity and thus the books in group two will become more and more important in the future as scientific books for children.

My Research: The Mystery of the Oriental Moth Cocoon (Summary)

Written by Shoziro Ishii

When Professor Ishii found the Oriental moth cocoons (*Monema flavescens*) while taking a walk, he suddenly wondered, "This cocoon is very hard, but how can an imaginal moth come out from such a hard cocoon?" and, "There are markings on the cocoons, but why is each and every one different?" This is how Professor Ishii began his research to solve the mystery of the Oriental moth cocoon.

1. How can a moth come out of such a hard cocoon?

The Oriental moth cocoon is so strong that even if you squeeze it between your fingers, it will not be crushed. The imaginal moth which emerges from this cocoon naturally does not have a mouth to bite through it. To solve this mystery, Professor Ishii cut up cocoons, examined their structure through a microscope, and observed larval and pupal through X-ray photographs. Through these studies, he found that the upper part of the cocoon had a circular line with a thin layer, which happened to be just where imaginal moths break through. The larval make this circular line before pupation for the moth emergence from the cocoon.

2. Why are the markings on the cocoons different?

There is a theory that cocoons on a thin branch have very clear markings and that the ones on a thick branch do not. But to come up with a scientific conclusion, it was necessary to do an experiment to compare the two under fixed conditions. Larval grown on the same feed had to be used and we had to let them spin a cocoon on sticks under the same conditions.

So Professor Ishii set up thick and thin sticks on a wire base frame (or kenzan) as used in Japanese flower arrangement, and set free caterpillars which were just about to spin cocoons. The larval would move around on the sticks, but could not get away since there was water down below. In this way, the caterpillars spun cocoons on sticks with a fixed thickness and under the same conditions. (He calls this the "Kenzan Method".) By very carefully watching the way the larval spun cocoons and doing different experiments to prove the tentative theory Professor Ishii was finally able to solve the mystery three days later, of why the markings on the walkers' cocoons are all different.

The Mystery of the Oriental Moth Cocoon

3. Why is the Oriental moth cocoon so hard?

Why is a the cocoon so hard to begin with? In any book, it says, "A cocoon is calcified." but no one had actually tried to study this through experiments. If it is calcified, it should contain a considerable amount of calcium carbonate ($CaCO_3$) or calcium hydroxide ($Ca(OH)_2$). But Professor Ishii found that it contained calcium oxalate ($Ca(COOH)_2$). Calcium oxalate does not cause the cocoon to become hard. Furthermore, he found that the substance was produced in the Malpighian tubes of the larva.

Then what is the explanation for the hardness of a cocoon? Professor Ishii focused on the brownish liquid larval that caterpillars spit out of their mouths when spinning a cocoon. This liquid is mainly composed of protein and by examining its amino acid composition, he discovered ß-alanine among them. This amino acid has recently attracted attention among academic societies around the world as a substance whose function is to harden the cuticle of insects. This is how he found that cocoon is hard not because of it being calcified but because of the function of sclerotized protein.

Prof. Ishii (author) & Mr. Seino (editor)

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(4) Editing Science Textbooks for Primary Schools

Atsushi Choji
Managing Director, Tokyo Shoseki Co.
Wataru Nomachi
Director, Science Editorial Dept., Tokyo Shoseki Co.

1. What to keep in mind when editing textbooks:

(1) issues related to Ministry of Education
- interpretation of content of the course of study
- inspection and approval

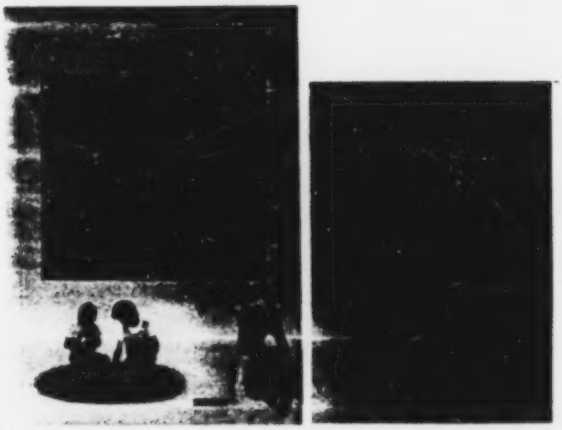
(2) responding to the trends of science education:
- inquiring approach or knowledge explanatory approach

(3) issues related to schools:
- actual state of schools
- actual state of teachers

(4) concerns for children:
- how to introduce the topic and to how direct questions
- what kind of illustrations children prefer

(5) measures to make the books highly competitive in the market:
- make the content easily acceptable for teachers
- good book design and layout with beautiful illustrations and photos
- make the sales policy clear

2. Editorial process of textbooks:



Science textbook for 1st & 4th grader of primary schools in Japan

3. Challenges of editors:

(1) selection of excellent members for editorial committee and of writers
(2) selection and training of excellent artists, photographers and designers for science books
(3) training of editors
(4) how to reflect the opinions of teachers of primary schools
(5) development of teaching materials, methods of experiments and observation
(6) others

1. What To Keep In Mind When Editing Textbooks - by Mr. Atsushi Choji

Before I get into the topic, let me explain a little about Tokyo Shoseki where we are publishing textbooks. Tokyo Shoseki is the largest textbook publisher in Japan and we publish textbooks on all the subjects for primary, junior and senior high schools. The total number of copies of textbooks we publish is 30 million annually. We publish not only textbooks but also reference books, teaching guides, video software and educational computer software. As for sales, textbooks account for about 60% and video software about 40%.

As for science textbooks, there are 6 publishers publishing for primary schools in Japan. There are 4 for junior high and 11 for senior high schools. Textbooks in Japan are not nationally published, but the private publishers submit the textbooks to the Ministry of Education and have them inspected and approved.

Today I'd like to talk about 3 major subjects:
1) What to keep in mind when editing textbooks, and what are the philosophies:

2) Actual editorial process of textboooks;
3) Tasks of editors. What are the problems of the editorial committee, writers, artists, designers and editorial staff.

I'd like to share with you some of the challenges we have in editing science textbooks and the measures we are taking to solve these problems. Let me first talk about the topic 1) above and then my colleague Mr. Nomachi will present the topics 2) and 3).

I have listed up 5 points which need to be kept in mind on your handout sheet. Of course there are many other points that have to be borne in mind, but I would like to focus on these 5 points for today. They are not in order of importance but are listed at random. The first point is, since the textbooks are inspected and approved by the Ministry of Education, we have to consider issues related to the Ministry of Education. The course of study is issued by the Ministry and our textbooks have to be edited in line with this course of study. In editing a textbook, therefore, the philosophy in the course of study must be thoroughly and accurately interpreted. At the same time, we need to maintain our own identity and independence in our textbooks. Therefore, based on this course of study we also need to put forth our own unique philosophy as well.

I'd like to explain about this course of study issued by the Ministry of Education of Japan. There are 3 objectives mentioned at the beginning of the course of study for primary school science textbooks. One is to foster love and affection for nature, the second is to foster abilities to investigate and examine nature, and the third to promote understanding of nature. When we edit our textbooks, these objectives are understood; but we also have our own objectives set for science books for primary schools, which are not totally different from those of the Ministry. One is to have children experience nature, which is close to the 'love and affection for nature' stipulated by the Ministry. Our second is to foster the abilities of children to solve problems, also similar to the second objective stated by the Ministry. Our third is to foster a scientific way of thinking. The Ministry's third objective was 'understanding of nature', which is a little different. We feel that merely learning knowledge about science is not sufficient; we should help the children develop more scientific way of thinking.

The course of study also states the content of the subject to be taught at schools and it is divided into 3 areas. The first category is biology and its environment, the second is matter and energy (physics), the third earth and outer space (cosmology). For example, let me explain to you what is stated in the course of study in the field of matter and energy for 4th graders. It says that pupils are to observe and learn what will happen when matter is dissolved in water. And also difference of dissolving speed by the temperature has to be examined. So solution and solubility are studied in 4th grade.

In editing our textbooks, we need to maintain our own identity as Tokyo Shoseki. Therefore we consider how to make our textbooks unique. We pay much attention to how the subject is first introduced to the children and the sequence in which the subject is taught. What is the first question that is given to children and what are the materials used in scientific experiments?

We try to understand what children are most interested in and what is the image that children have of solution and solubility, for example. So it has to be surveyed thoroughly. We have here a report of the result of a survey we conducted. The title of the report is children's awareness and process of study on solubility in primary schools. So let me introduce to you some of the findings of the survey.

We gave questionnaires to school children from 1st to 6th grade and we asked about the ideas they had on matter dissolving in water. The first question was, what do you think will dissolve in water -- rock, salt, sugar, wood, rice, soap, iron, paper, door, butter, bread, instant coffee powder, air and erasers? Children thought sugar, salt, soap and instant coffee would dissolve in water. But surprisingly, many children also thought butter would dissolve in water. The second question was; if salt dissolves in water it disappears. So, what do you think happened to the salt? As a result they said that, since salt disappears, it is no longer there, and there is only water. Some children said that water tastes salty so that the taste only remains but the salt itself disappeared. Also some children believed that even though it is not visible, the salt still remains in the water. 5% of the children thought that the salt completely disappeared. 41% thought that only the taste remained but everything else had

disappeared. And the proportion of children who thought that the salt remains though it is invisible was about 50%. So about half the children thought that the salt had completely disappeared.

Before introducing the subject, we have to consider how this misunderstanding can be eliminated. So, just taking solution and solubility alone, we first have to understand how children perceive the subject and then start editing the textbook.

Since the textbooks have to pass the inspections of the Ministry of Education to be published, we take great care about it. There are 3 criteria for inspection. One is whether the content is in line with the course of study; the second is whether quantity and structure of textbooks are also in line with the course of study; and the third, whether the description and illustrations in the textbook are accurate. But these criteria are very abstract and the subjectivity of the inspector is also influential, so we have to also know about the behaviour of the inspector when we edit science textbooks.

Secondly, let me talk about trends in science education. There are two approaches; one is the 'inquiring' approach and the other the 'knowledge explanatory' approach. In primary school, the inquiring type of approach should be given preference. Thirdly we have to take into consideration the issues related to schools. We have to know the actual situation of schools. For primary school, for example, we have to know if there is an environment which makes it possible to observe nature near the school, and also the availability of experimental labs in the school is also important. So based on the environment and facilities available, the textbooks have to be edited. We also have to know the real situation regarding teachers in schools. In Japan, there are only very few schools where science teachers exclusively teach science. In primary schools, one teacher teaches all the subjects in most cases and some teachers may not have scientific knowledge. Therefore, we have to edit the books so that even those teachers can teach science to children.

Also we have to know how the teachers teach in science classes, whether they just write on blackboards or they prefer to carry out experiments in labs when they teach science. So these aspects of teachers also have to be studied carefully. Fourthly, because textbooks are actually used by children, we have to know about them. Children should be able to readily accept science topics. Therefore, how they are introduced to the topic and what kind of questions are presented to children are very important. These will be explained to you in detail later by Mr. Nomachi.

What kind of illustrations are most attractive to children? Since the preference of children as to illustrations has to be studied, we do a survey, showing samples of various illustrations to children and asking them what type of illustrations they like. Then we make a decision on the style of the illustrations to appear in textbooks, so that the children will feel more familiar with them.

And finally, measures to make books highly competitive in the market are another point to be kept in mind. Our textbooks are on the market competing with those of 5 other publishers. So the textbooks must be more acceptable to the teachers and the book has to be highly rated. So we make sure that the textbooks are readily accepted by the teachers, especially since some teachers who are not specializing in science must immediately be able to understand the content and how to teach the science subjects. Also, younger teachers tend to like textbooks whose visual aspects, such as illustrations, photographs and page layout, are good. Therefore, these visual aspects are critical if they are to be accepted by the teachers.

Finally, in order to make the textbook competitive in a market, we must have a clear sales policy, so that the marketing staff of the publisher can sell the textbooks to the teachers. The first sales point of our textbooks is to have the topic introduced to children so that they will be strongly interested in it. Secondly, we emphasize observation and experiments which would give immediate results. Also, when experiments are conducted, some accidents may happen during the experiments, so safety and prevention of accidents are also very important. So in our textbooks, we emphasize that all the experiments are safe and accidents are very unlikely to occur. Also, another sales point is that this textbook has photographs, illustrations and materials that were collected nationwide. Japan is a country that stretches from North to South from Hokkaido to Okinawa, and between these points the

flora and fauna distribution is very different. Also from the perspective of geology, there is much variance between the different geographic areas. So the fact that the textbook geographically comprehensive is a strong sales point. In editing textbooks, therefore, I think that these five points should be kept in mind and editing policy should be based on them.

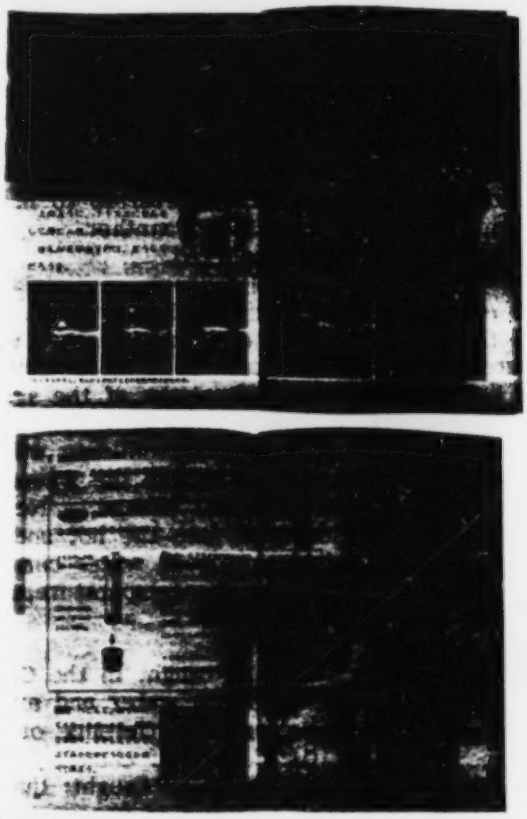
2. Editorial Process of Textbooks - by Mr. Wataru Nomachi

As you see, the size of our textbooks gets smaller for the 3rd grader and up compared to those for 1st and 2nd graders. And we have a common aim for the cover, that is, when you see the picture on the cover, you should be able to imagine the sound behind these pictures. For my presentation I'd like to focus on one unit in the curriculum as an example rather than talking about general things. In this way I hope that you can also understand the general situation better. I'm going to talk about textbooks for 4th graders, whose age group is 9 to 10 years of age.

There are 22 items listed up in the course of study to be satisfied in the 4th grade. One of them, for example is to teach about the water and air change volume according to the difference of temperature. Another one is that the water is changed into ice or vapour depending upon the temperature. The two items are taught in the chapter, 'Water and Air' in our textbook. 12 school hours are allocated to this chapter, so according to our plan, we have 18 pages to cover it.

In total there are 138 pages for the 4th-grader science textbook, which is in two volumes. The chapter "water and air" is taught towards the end of the school year. Since one of the sales points of our textbooks is to motivate children to be interested in the subject, I would like to share our experiences with you as to how to attract children's interests.

There is one experiment we use to introduce the subject. .....now you have an empty flask with a lid. If you dip it in hot water (about 60°c), the lid will pop off. So why do you think the lid popped off? That must be the air trapped in the flask..... Through such experiment, children start to wonder why and how an empty flask could have enough energy to pop off the lid. In this case it is rather a simple experiment, so they may guess that when the flask is heated, some energy release related to air will occur; and then they want to try to prove how it works. So we can introduce other experiments to satisfy their interest.



from science textbook for 4th grader chapter for AIR AND WATER

When you soak the empty flask, with its lid, in hot water, then you see foam coming out of the flask. The vague idea that the air has something to do with it will be proved when the children conduct the next experiment, which is immersing the flask covered with polyethylene and rubber band in hot water. The polyehylene will inflate, so children learn that air expands when it is heated. Then, they actually want to see with their own eyes how much the air expands and convince themselves through actual experiment. So we introduce the next experiment using disposal syringes, which are rather easily available at schools from school doctors. When the air expands, the piston will pop, showing how much the air has expanded by the gauge on the syringe. Next, children will say, what would happen if you cooled the flask? The same kind of experiment can be done, warming the flask then dipping it into cold water. The air

contracts and the piston on the syringe comes down. So in this way, children will understand what happens if air is heated or cooled. At higher temperature air will expand and at lower temperature it will contract. Through their own experiments, children will be fully convinced that is what happens to the air when the temperature changes. So with these experiments, we have fulfilled the aims of the course of study. But the children will inevitably ask what will happen to water when it is heated. This is because, from the 1st grade, air has always been referred to in comparison with water. So another experiment will be conducted.

Again we use two disposable syringes. One of them is filled with air and the other with water and both of them are sealed and dipped in hot water. While the piston of the syringe with air inside goes up, the other, with water inside, hardly moves. So the children will start to think that even though the water is heated the volume does not change. Next, we put a thin glass pipe into the hot and cold water, then we find that even water changes its volume according to the temperature, but not much compared to air.

Thus the first item is taught in the Course of Study; that is, that both water and air change their volume with a difference of temperature, but the degree of change differs. Now the second item is to be taught; that water changes form into ice or vapour according to the temperature. So we try to help children to find out the answers and the answers will lead to the children's next question, and so on. We believe that it is a good way to have children use such consecutive chains of questions and to develop them. So we try to emphasize this process and then provide answers through the textbook.

Regarding the 'scientific thinking' that was mentioned earlier, through these experiments, children think about so many things. They think based on all the information and experience they went through, and make assumptions. Or they start to think what can be summarized from the result of an experiment and so on. Sometimes children will come up themselves with new ideas and methods for further experiments. This is the development of the mind for science and the process of thinking scientifically.

Now what are the points that attract teachers in selecting textbooks? There are various approaches in judging the textbooks. One of the elements they look for is whether the process of problem-solving and the flow of learning presented in textbooks is suited to their own ideas or whether they find them interesting or not. But there are also those teachers who pay more attention to each method of experiment. There are those who emphasize the accuracy and esthetics of illustrations and photographs. Although criteria for evaluation of textbooks differ among teachers, we think it is most important to perfect this kind of problem-solving process in them. In other words, our main task is to present a draft plan for teaching, as to subject matter, which process to use and how many hours should be devoted to teaching it. As explained earlier, the items mentioned in the Course of Study appear in very simple sentences and one may say that making children understand by showing them some experiments is very easy.

However, our assumption is basically that children of primary school age are not interested in studying. Unless they are interested by themselves, or motivated, they do not continue to investigate more. So our most important mission is how to stimulate their interest.

Regarding how we introduce the subject, I'd like to discuss one example 'how things burn' in the 6th-grade textbook: First we show flames of types familiar to them including candle, alcohol lamp and gas. Although the materials differ from solid, to liquid and gas, the shape of the flame however remains the same. Then what is the flame? We thought this itself would not be sufficient to attract the children's interests. So we would start with how the candle burns. When you put out the cadle flame, white smoke will rise. What is this white smoke which obviously, has come out of the candle? The secret of burning can be considered to lie in this fact. This is the starting point of the introduction to the subject.

So we show children an experiment, putting fire close to the white smoke so that the the candle will light again. This experiment looks like magic to children. So the children have questions and are interested as to what the nature of this smoke is. In this way, they get a strong impression as to what a flame is. This is one example of an introduction which was highly evaluated.

I would like to introduce to you another popular introductory experiment. This is boracic acid solution and it has a high temperature. As you know boracic acid can dissolve completely in water when heated but do not dissolve so much at lower temperature. As the temperature falls, you can see the small particles sparkling. Then children start to wonder what these particles are coming out from the water. That is how we suggest to start the learning process in textbooks.

So we are spending a lot of time considering how to make the starting point of learning interesting for children. Sometimes such a start sets directions for the child's life, and I would like to share with you a little from my own experience. When I studied heat in primary school, my teacher showed me an experiment. A thick paper was put over the fire and of course it started to burn. Then, my teacher asked us what we thought would happen if we put a paper container with water inside, close to the fire. We thought, since during the last experiment it burned, so this time the teacher was showing us something that would not burn. However, I told my teacher my frank feeling that since paper is paper, it will burn. Well, it did not burn, but rather the water inside started to boil and steam started to come out of this paper container. I thought this class was very fascinating. So I think some of the youthful experiences I had when I was a school child probably prompted me to pursue the subject of science later in life. I think the content of textbooks must be child-oriented, and this is what I have been trying to explain up to this point.

3. Challenges for Editors

Now, let us go on to the third topic, the challenges for editors. There is something I would like to stress on this point. What are the tasks of editors? At the end of our textbooks is a list of writers, and on the list, there are scholars prominent in the field of science, writers, educators, primary schools teachers, artists and photographers. And in recent years the names of designers have also been listed at the back of the textbook. So all of these are involved in creating textbooks and each has a different role to play. Now, how should the editors be in contact with them? We ask for the contributions of scholars who have their own records and experiences of their studies and also a deep interest in education. And when they get too old, we ask them to recommend their successors. We have been trying to keep in touch with the scholars and we have been able to obtain very good guidance and advice from these scholars and also those in the field of education. Teachers who are actually teaching in the classrooms are mainly involved in writing and giving valuable input, because they know exactly how children would think and react.

With page limitations, we have to also take presentation into consideration, and made to children and input from schoolteachers is very important. Then the written material will be examined by scholars, other educators and the editorial department. As for textbooks for primary schools, illustrations and photographs play a crucial role. Over many years of contact with artists and photographers, we have been able to develop good illustrations. We have had contact with these artists for maybe many decades and sometimes from they start their careers until they die. So as we develop relationships with them, we are able to learn how we can incorporate those illustrations and photographs in textbooks. The illustrators and photographers also learn exactly what art work is to be incorporated into the textbooks, almost by intuition over so many years. But of course, the textbook illustrations should be in line with the educational objectives, and it is imperative that they show the most important phenomena. They should also eliminate any unwanted or unnecessary elements which can interfere with the child's thinking process, for example.

It is very difficult to take photographs that are precisely to the point. So we set up situations so that the most desirable photographs can be taken, and there are many consultations with the photographers. Let me share with you my personal experience. In 1961 we were to take a photograph of bubbles. As you know bubbles show beautiful colours and we thought that, in introducing the subject of soap solution to children, we should show the soap bubbles in the textbook. So I asked a well-known photographer to take photographs of soap bubbles. But because they move, it is very difficult to take such a photograph, especially their beautiful colours. So it took all day to take one good photograph. This was in the middle of summer and the soap bubbles would not show the colours in a bright place, so the photograph had to be taken in a dark place

with light from different angles. The summer in Japan is very hot and humid and we had to shut ourselves up in a confined room. It was 30 years ago, so there was no air conditioning, and so we took off our clothes and were staring at soap bubblea all day in the hot, dark room. Finally the photograph was taken, and when we looked at it I thought it was an excellent photograph and was very happy.

But the photographer wasn't satisfied with the photograph, so I asked why. He told me to look at the photograph through a magnifying glass and we found a reflection of the photographer in the bubble. Also we saw ourselves with only our underwear, since it was so hot. If it had been for a small section in a textbook, maybe it wouldn't have been a problem; but we thought we should retake it. It took another three to four days to take a picture of a soap bubble.

So taking one photograph often requires a great amount of time and effort. We have had contact with this particular photographer over 30 years and so when we asked him to take some photographs, he knew exactly what to do, came up with a perfect photograph within three or four days. However, just a few days ago, unfortunately, he passed away. Anyway, we do have contacts with other artists and photographers for a long time, and over the years they have also learned exactly how to take a photograph or to make illustrations for textbooks.

In recent years, designers have also come to play an important role. Textbooks have to be visually beautiful and attractive to the teachers, and easy to use in class, so the layout and design have become very important elements. Therefore, we tell professional designers the intentions and objective of the editorial department and then have them layout the pages. Designers take great pride in their work and they want to show it to the world. But that is not the objective of textbooks. They have to be effective and functional in the classroom, so the presence of designers should not be too predominant. The front cover of a textbook is redone many times, sketches are made over a dozen times, and then the design of the front page is finalized.

So what is the role of editors, then? Writers write the text, the photographers take photographs, and designers layout the pages. So the role of the editor becomes the key question. I think the role of editor is very difficult. Maybe it is presumptuous of me to say so, but I think we are like conductors in an orchestra or producers of a play. In an orchestra, there are excellent players of instruments, but if they start to play at random, they will not harmonize into good music. The original intention of the composer has to be interpreted by the conductor, and the conductor has to orchestrate and harmonize the total performance of the orchestra. Thus a good orchestra is born and I think that's exactly like the role of editor. We have to well coordinate the scholars, educational professionals and school teachers. We have to support them in formulating an excellent plan and specify to the artists and photographers exactly what kind of artwork and photographs we want. And also we make it clear to the designers that the designs themselves should not be over-emphasized, but the function of a textbook has to be emphasized in the page layout. So editors are the ones who orchestrate the activities of all the players involved in textbook making.

There is, of course, a diversity of roles that we editors have to play. We have to know about education, and how our children are taught in classrooms in primary schools, for example, through surveys, etc. We have to know exactly how the children behave so that we can can make proposals to school teachers. We need to make our textbooks enjoyable and attractive to both teachers and children, so we need to have a certain degree of esthetic sense. We also need to have knowledge about printing, and its possibilities, for instance. And we have to be careful in proofreading the entire content. If any major mistake is found in textbooks, all the major national newspapers will criticize us. We have a great responsibility. Ideally speaking, editors have to have knowledge in all of these fields. So you might ask "Do you have that kind of capability?" But I cannot say I have all these capabilities. In Japan we say, although there are many things that have to be done, even though the sun has gone down there is still a long way to go. In other words, it is very difficult to accomplish a task. This applies to editors too, and we have a long way to go.

As Mr. Choji mentioned earlier, we have to know exactly how children behave and also we have to know especially about the comments and opinions of the teachers who use our

textbooks. Were they easy to use? Some teachers may say that they wanted to do a certain experiment but were not able to get the appropriate apparatus, or they may say that they were not able to understand the objective of this lesson after experiments. So these opinions and comments by the teachers are very important.

Up till now, the Japanese textbooks have been revised every three years. So for three years the same textbooks were being used. But in these three years, through various measures, we have tried to reach the teachers and ask them what they thought when they used our textbooks, because we want to reflect these opinions and reactions in the new revised versions. So we personally interview those teachers if we know them very well, and also we sometimes send out questionnaires. In various ways, we collect information from them, so we are always keenly aware of the teachers' feelings about our textbooks.

And also in science classes, methods of observation and experiments are crucial. I think observation and experiments are basis for science and science teachers are very interested in them. So development of methods for observation and experiments is one of the key roles of editors. There are professors who are conducting studies on observations and experiments, so we have meetings and through discussion we try to find new ways to experiment. Also, throughout Japan, there are many papers that are presented on experiments and some very interesting methods are discussed. So we need to be aware of this new information as well. Also we learn from textbooks from abroad. We can sometimes incorporate some of the methods used abroad into the Japanese environment.

Science experiment at Yodobashi Dainana Primary School

(5) Editing Photographic Science Books and Kamishibai

Tsutomu Okazaki
Editor, Akane Shobo Co.

1. Introduction

Scientific knowledge, linked with technology, has contributed to making the life of human beings rich and convenient. Moreover, science and technology, closely connected with industry, have supported the epoch-making development of modern nations. Science has played an important role in the development of civilization. And the publishing industry, in which we are engaged, is based on the scientific technology of printing.

Human beings cannot exist without the rich natural resources and energy of the earth, and they cannot be replaced by any technology. Where do these resources and energy exist, and where do they come from? They are in the natural elements of mother earth (earth and water) and the sunlight.

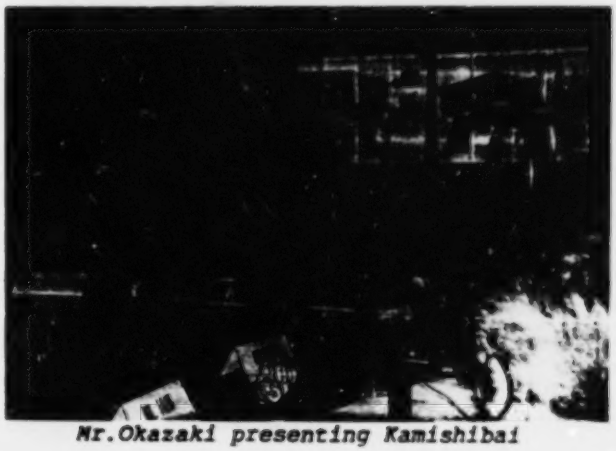
The natural environment is not only inorganic, consisting of spheres of air, water and rock, but also organic, having so many kinds of creatures, such as minute bacteria, plants, bearing beautiful flowers, insects coming to these flowers, birds flying in the sky and animals running around; which are all interrelated. Inorganic environment influence the organic environment and vice versa. These complicated and close relationships change as time passes. This is the law of nature. Humans being a part of the nature, we are not the exceptions of such law.

Science and technology have made great progress in this century. For example, we have learned about the atomic world which can not be seen by human eyes, and about space, which is some billion light years away. We can even make a trip into space. On the other hand, however, we are destroying nature in so many parts of the earth by not paying attention to the laws of nature, as evidenced by climate changes due to the increase of CO_2, acid rain, destruction of the ozone layer and radio-active contamination caused by nuclear power plant accidents. Why is it that we repeatedly destroy nature and mother earth? It is not an easy problem to solve when politics and economics intervene. It is adults who are participating in or cooperating with the destruction process of the earth. If this continues, we can only leave to our children an earth where not much life can survive. Our responsibility is to pass on the riches of nature to future generations.

It is on excitement and deep impression that we should place importance when children first encounter nature and the universe. We want them to know the wonderful world of life, to know the importance of nature and the mysteries of the universe. Such an encounter with nature is extremely important for children. Nature is a great classroom and a teacher for them. The mental development of children is closely related to such encounters with nature.

2. Children's environment in Japan

Although more than 70% of the country used to be forest area in Japan, a lot of natural surroundings have been lost due to the rapid economic development in the past 20 to 30 years. Many people must live apart from nature due to the population concentration in the big cities. We can also see serious social problems arising among children who live in such an



Mr.Okazaki presenting Kamishibai

environment. Even in rural areas, however, where they have comparatively more natural surroundings than in the cities, children tend to have fewer opportunities to relate to nature than before, and they are facing similar problems as in the cities.

3. Invite children to encounter real nature through science books

Why do children need nature? Why do we need it? I will share my thoughts with you through discussing the following materials that I have produced.

(1) Science Album Series (104 volumes in total)

a) How it was started (with historical background)
b) Media, methods and how to develop pages
c) Effects of photographs
   - zoom and enlarging
   - telephotograph
   - capturing the moment
   - serial photographs
   - others (X-ray, ultraviolet photographs) (slide demonstrations)
d) Making a book on themes taken from familiar natural surroundings (e.g. "Swallowtail butterflies" photographed by Mr. Yukou Sato and written by Mr. Noboru Hondo)
e) Observing the life cycle and realizing environmental issues from familiar natural surroundings
f) Why do we want to make children encounter nature?

(2) Creating Photo-Kamishibai (picture story-telling)

a) Possibilities of photo stories
b) utilization as panels for school education (instruction materials)
c) utilization in nature observation field trips

(3) Others

I. Science Album Series - photographic children's books

The first title in the Science Album series "Let's observe the moon" by Akira Fujii was published in 1970. In 1988 with the publishing of the final title "Mystery of Colours of Flowers by Aritsune Sato, the series was completed. Over 18 years, 104 titles in total consisting of 100 main volumes and 4 supplementary, on various topics in nature such as animals, plants and astronomy were introduced. Reprints have been continuously made and so far 16 million copies in total have been sold, and translations were also published in USA, Canada and in Republic of Korea.

The former editor-in-chief of Akane Shobo Publishers, Haruo Yamashita, who is now a writer of children's literature, was the main person to initiate this series. He started it because he realized well that children could develop their scientific thinking while playing with nature. There are more than 200 persons involved in publishing this series, including photographers, writers, illustrators and supervisors. In particular, it is commendable what the photographers have achieved.

Another important person on this project is Jun Nanao, who is also a writer of children's literature and a director of the photopraph library. He acted as a producer of the whole series and also was a good consultant for photographers. The sensitivity of these two writers characterizes the content of the series.

The specific feature is summarized as a collection of impressive photographs capturing the lives of the natural world and of the universe. Other main features are as follows:

1. One theme is selected for each title which enables the content to be probed deeply and it also introduces the author's 'discoveries'.
2. Life in nature is presented in dramatic and powerful photographs.
3. Beautiful photographs and simple sentences make the readers enjoy the book as if they are reading an interesting picture book.
4. The readers are motivated to direct their interest into action so as to confirm the content through experiments and observations.
5. It can nurture the scientific thinking, care for nature and care for life among children.
6. Make-up and printing of the books are made easy to read and easy to handle.

II. Science Album Series - Kamishibai

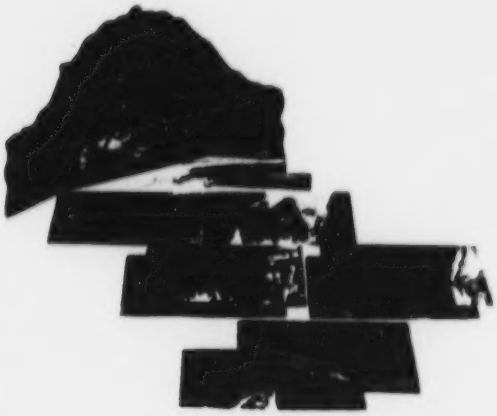
This is a sister series of the children's books series and its target age is a little below that of children's books, due to the characteristic of the media, Kamishibai. Kamishibai consists of several sheets of pictures and the text are written on the reverse side of the pictures. As the story-teller shows the pictures to the audience one by one as the story proceeds, he/she reads out the story written on the back. The presentation has theatrical characteristics and communication between the storyteller and the audience is easily possible.

The know-how accumulated through publishing of children's books series has been utilized to produce the Kamishibai series. Abundant information through publications, television, radio, and films, etc. surrounds children and it is increasing. In particular, television plays the major part and moreover, video has expanded the scope of television. We should take note of the fact that only one-way communication is possible in television. Printed materials, however, are more suitable for the readers to stop and think about the content of the printed materials whenever they want to.

Kamishibai is quite close to picture books but the difference is that Kamishibai has both the story-teller and audience in one place. They can enjoy the story together through close mutual communication. It has been pointed out that television has an enormous impact on children's problems in their mental development and in communicating with others. In such circumstances where television and video are enjoying overwhelming popularity today, we are presenting this Kamishibai series conveyed through the human voice, so that it will help to nurture the capability for true communication in children.

The themes are taken from nature and they are in line with the picture book series. They try to foster the importance of nature, life and affection for them, which is the basic philosophy of the series. The following characteristics can be pointed out:

1. The ecology of familiar insects, birds and plants are captured well through enlarging and instantaneous eye of photographs. Big-sized and powerful pictures can be enjoyed as 'Big Books' also.
2. The stages of the life cycle of one creature are introduced in one volume. It tries to convey the respect and importance of life through a drama of life, birth, growth and death.
3. The story is easy to understand and enjoyable. It can attract children's interests to nature and provide a chance for children to develop communication with others and their scientific thinking.
4. It is useful as reference when you observe familiar creatures and when you look after them at home or school. It can be a supplementary material for school use.
5. Picture sheets are also separately used in classrooms during lessons. They can be utilized also as instructional panels during outdoor study.



(6) Science Experiment Kits and Teaching Aids of Gakken

Yasushige Uchida
Director, Science Editorial Dept.,
Gakushu Kenkyusha Co.

"Science for Grades 1-6"

- founded in 1960
- circulation 320,000 (average)

1. Characteristics

1) The only science magazine in the world for different grades

2) Every issue has science supplementary materials

2. Editorial policy

The following editorial policies are taken up to realize the objective:

"To develop creative thinking in children".

1) To meet children's desire for knowledge and to respond to their curiosity

2) To instill the habit of confirming the facts by themselves

3) To generate thinking ability in children

4) To make science lessons in school enjoyable for children
(They are useful for preparation and reviews of their science lessons.)

3. Editorial points to be regarded

1) To understand real needs of children through questionnaire, information from teachers, playing with children and the free telephone dial programme "Why and How Dial No. 110"

2) To contain interesting and easily understandable issues for children (contents, sentences, diagrams, photographs and activities)

4. Supplementary science materials

Recognizing that it is necessary for readers to observe the scientific phenomena with their own eyes and to confirm them with their hands and to understand them by themselves in order to obtain real scientific knowledge, the magazine has supplementary science materials such as scientific instruments and raw materials for experiments and observation.

Some examples of supplementary science materials

1) Experimental instruments in easy physical science
   -Air car (grade three)
   -Camera (grade five)
   -Detector for metal (grade six)

2) Experimental instruments in easy chemical science
   -Experimental instruments for colouring water (grade one)
   -Food analysis (grade six)

3) Observational instruments
   -Reversible sides microscope (grade one)
   -Microscope of 150 times magnification (grade four)
   -Astronomical telescope of 40 times magnification
   -Thermometer (grade three)
   -Planetarium (grade five)

4) Biological instruments
   -Small animal breeding instruments
   -Brine-shrimp (grade one)
   -Horseshoe-shrimp (grade two)
   -Mansion of ants (grade two)
   -Plant-culture instruments
   -Bulb (grade one, two and three)
   -Seed (morning glory - grade one, sunflower - grade two, etc.)

5) Food materials
   -Tofu (soy bean cake) making (grade six)
   -Ice cream making (grade six)

6) New raw materials
   -Resin to absorb water
   -Metal to memorize shape
   -Model of skeleton (grade six)
   -Melody ladybird

(7) Editing Scientific Picture Books

Kazu Yamada
Editor-in-chief, Science Section,
Fukuinkan Shoten Co.

Preface

Before making comments on my personal experiences regarding the editing work of scientific picture books for children, I would like to present my basic understanding on the reason why I edit such picture books and how science relates to children and their future. Even though this may sound a little bit exaggerated, I feel that what I am trying to say is quite important to all those people who are concerned with editing and publishing scientific books.

Formerly, human beings lived in natural surroundings, being blessed by nature. Until some decades ago, the destruction of the environment on a large scale was only possible in a limited manner by limited people, such as by war waged by the authorities, nuclear testing, or pollution by large enterprises. At that time, when scientific technology had not yet penetrated into the common sphere, the earth was never seriously threatened if only those limited authorities had enough reason, conscience, and correct understanding of nature.

Today, however, as scientific technology has greatly progressed, the conditions are beginning to change completely. Due to the outstanding efficiency achieved by scientific technology, it is quite possible for even a small nameless factory to destroy the environment on such a large scale. We have never experienced such a situation before in our history, and it means that each individual is required to have reason, conscience, and a correct understanding of nature and scientific technology. Therefore, correct understanding of nature and knowledge in science are necessities for the children, who are responsible for the completely new age to come.

What the First Picture Books the Children Encounter Should Be

We tend to classify picture books into literary ones and scientific ones. In young children's world, however, there is no clear division between the two, and just like our daily lives, it is not separated, but rather acknowledged as a whole.

Here, I have introduced a so-called 'illustratd book of objects' in our country. There are very few words in such books but many pictures of various things are found. The construction is also simple, introducing those objects familiar to young children. When a child becomes about three years old, the parents often buy him or her one of these illustrated books and read it to them. If the child starts to name these objects in such books, the parents are greatly pleased, thinking that their child may be a genius or may become a scholar in the future.

Memorizing the names of various objects, however many, does not produce any further development. Actually, in one nursery school, the children loved elephants probably because the teacher had always shown them an elephant in a picture book. The children, however, had never seen a real elephant. So, the teacher decided to take them to the zoo to see the real elephant that they all loved so much. When the children saw the real elephant at the zoo, however, they did not respond to it at all.

To the children, a real elephant was way too large, compared to what they had known in the book. So they did not think the real elephant was 'the elephant'. In front of the elephant's cage there was a picture of the elephant. They were happy to see this picture, saying 'Here is an elephant'. It was a signboard showing the difference between an Indian Elephant and an Asian Elephant. The teacher was shocked and very troubled. He said to me, "I have always thought it important to show the children illustrated books of objects. But I guess we should show them the actual things, too".

This episode gives us an important insight into illustrated books of objects, how scientific picture books should be, and also how to introduce these types of books to

children.

To tell you the truth, the 'illustrated books of objects' are not for making children memorize the objects in the books. Such books are actually for the children to find the relationship between the objects and themselves and broaden the scope of their own world.

For example, here is a book called 'Cars'. As I go through the pages, I find various cars we usually see around us, such as trucks, fire engines, regular cars, and gasoline trucks. Looking at a page, a child may say, " Oh, here is my Daddy's car." I cannot determine whether it is the shape or the colour of the car that makes the child say so. I suppose, however, that this very moment must be 'the moment' the child really encounters a certain book. Something that had always existed in an ordinary way suddenly draws much closer to the child. Through such an experience, a child may become interested in other cars, which means that, by using the book as a medium, a new world had opened up for the child in relationship to 'objects'.

As we go on thinking in this way, we begin to understand what kind of quality and content are required of the 'illustrated book of objects' and the scientific picture books. Clearly, it is not the number of objects included in the book. The things and number of materials which are within the children's interests and scope of activities becomes important. The quality of the illustrations naturally becomes an essential point. These illustrations need to be accurate so that the readers may clearly compare the illustrations in the book with the actual things. They also requiere artistic quality to draw the readers closer and closer. Since the actual animals that the children see move around, the illustrations of animals cannot be static like those found in scientific picture books for adults. The animals are not always standing still sideways, either.

Considering these points, we are able to figure out how the editing of 'illustrated books of objects' and children's scientific picture books should be carried out. Now, I would like to go ahead and speak on the details of the editing work of scientific picture books.

(1) Planning and making requests to the author and the supervisor
(2) Gathering materials
(3) Quality of the original illustrations
(4) Checking with the facts
(5) Way of expression. The meaning of actual size expression. Children's tendency to perceive the illustrations to be larger than the actual size.
(6) Design and layout. Simplicity and amusement.
(7) Importance of colour control in printing
(8) Others

Observation visit to Suginami Central Library
(collection of Japanese science books for children)

(8) Workshop on Producing Science Books for Children

Satoshi Kako
Specialist on Children's Culture

Diversity in backgrounds of participants in the training course:
We have such a variety of participants including; editors, writers, researchers, textbook specialists, educationists with different length of career and with different target audiences.

Diversity in the kinds of science books they are engaged in: The kinds of science books in which the participants are involved cover a wide range including science textbooks, general science books, science magazines, science picture books, science picture dictionaries, science cartoons, manuals for science teachers, etc.

Through lectures/discussions held last week, the participants have reached common understanding on the important points and characteristics of various forms of science books for children, such as science textbooks, science journals, science picture books, science photo books, Kamishibai, etc.

In order to achieve expected results based on individual needs of each participant, the following workshop is going to be held with the mutual cooperation and active involvement of the participants.

1. Each person is expected to select a minimum unit of content for today's work. For example, there are some tens of thousands of items included in a science dictionary. And each item can be also divided into smaller items. Depending on the age and conditions of readers, the participants will choose freely the smallest and most simple items for the workshop. With the accumulation and combination of these small items, different kinds of science books can be composed.

(a) Please prepare a draft copy for printing through the planning and editing stages. The total number of pages will be 8 pages which will include introduction, development of theme, description and conclusion. When the audience consists of children, development of content in three phases (subject/problem presentation, description and clarification) and drama development method are suitable. You can use 2-3 scenes for each phase and therefore 8 pages may be most appropriate. If you need more pages, items should be further divided. So a series of 8 pages is the length of our activity today.

(b) Please prepare title, text (explanation) and illustrations.

Title:
It should arouse and retain the interest of readers and it should be clear and impressive.

Text (Explanation):
It should be brief and appropriate. It should not be too long nor too short.

Illustrations:
Illustrations are indispensable for children's books. When the readers have difficulty understanding the text due to their limited experience, illustration plays a very crucial role in guiding the readers to a clear understanding of the content. Since this is not a workshop for illustrators, content of illustration is not questioned as to whether it is good or not. And if necessary, you can give specifications in the actual place of the draft copy as to what kind of illustrations or diagrams you would like to introduce. Due consideration should be paid to the total structure, legibility, readability, size of type, colours, continuity of pages and flow of contents, etc.

2. Outline of Workshop

a) Each person decides on 1) the kind and the target audience of science books and 2) 2-3 items they want to take up for the work, and present them in plenary.
e.g. Mr. A/science journal/rain and river
Ms. B/science picture book/cotton and rice
Mr. C/textbook/sea and water

b) Those persons who decided on similar or common topics get together and form a group.

e.g. Mr. A and Mr. C and others form a group with 'water' as a common topic.

c) Through group discussion on the individual plan and problems, the members discuss and advise each other in order to make the individual theme (topic) clear. The group work is finished when the individual final theme (topic) is decided.

The discussion will be free, with no chairperson in particular. The purpose is to mutually help one another in deepening one's own thinking and for self study.

3. Actual work by individuals

a) Each person drafts the material. Questions to the instructor are most welcome.

b) Actual production of materials

Colour and size and face of types, etc. should be as practical as possible. When this is not possible, you should add explanation or footnote to supplement it. The size can be varied according to the content. However, in this workshop, we will use 8 pages as a principle and if necessary various devices can be added. (e.g. using longer sides horizontally instead of vertically.)
The final product should be camera-ready copy which can be brought directly to the printing house. And it should be large size so that the characteristics of the book, emphasis and the intention of editorial work can be easily presented in the reporting of the plenary session.

c) Production continues

When completed, the prepared materials will be presented by the participants.

4. Each participant will make a presentation of the product followed by question/answer. The participants are also expected to learn the good points from the results of other participants.

a) Evaluation and impressions

Workshop Schedule

19 November 1990

Orientation
Deciding the item and reporting on items
Group discussion and deciding final theme
Production of material

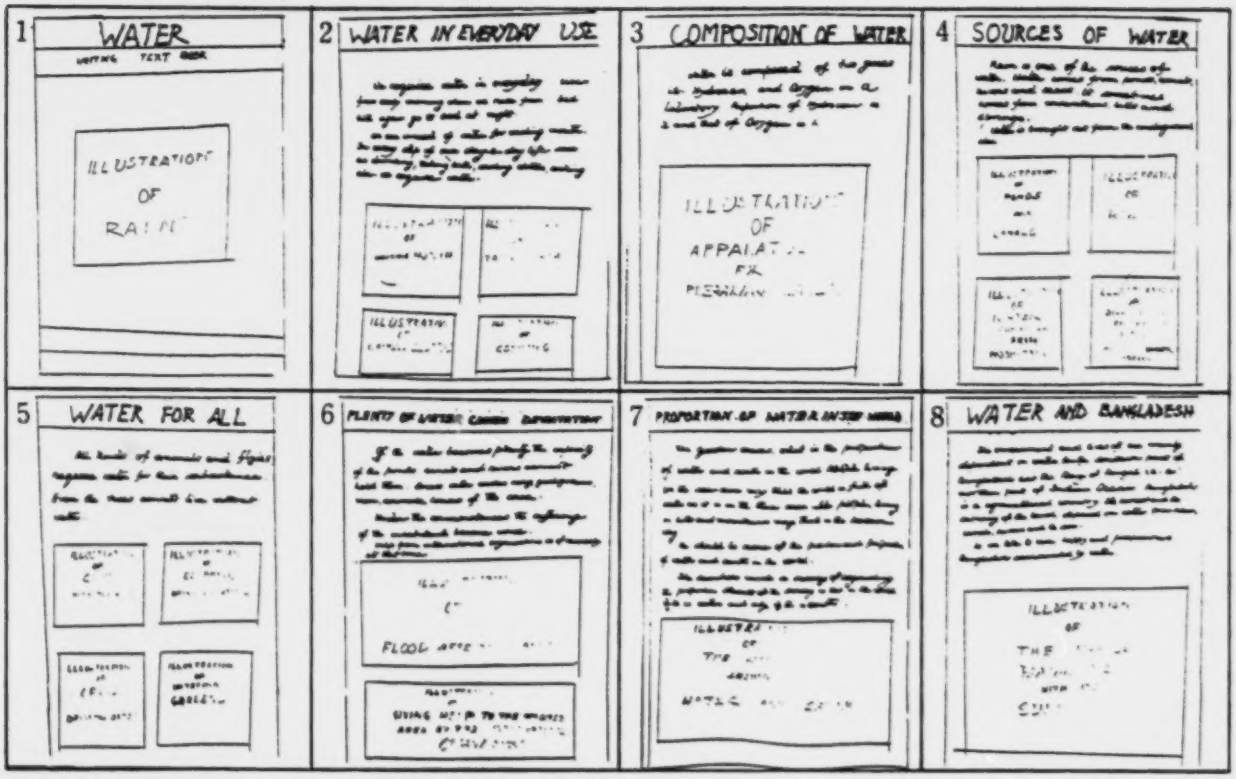
20 November 1990

Production of material continued
Presentation of materials prepared and explanation
Evaluation

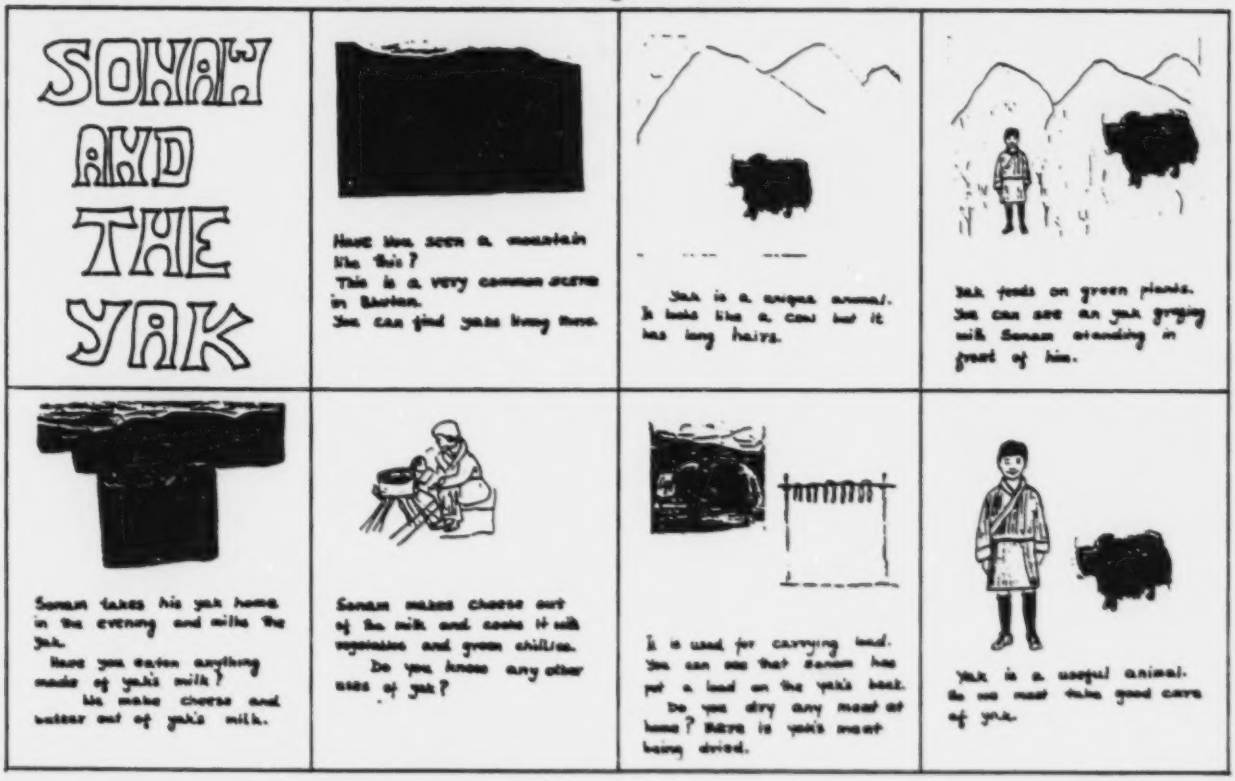
Dr.Kako explaining about his science book making

participants' works

"WATER" by Chittaranjan Saha (Bangladesh)



"SONAM AND THE YAK" by Maina Kumari Kharga (Bhutan)


SONAM AND THE YAK
Have you seen a mountain like this? This is a very common scene in Bhutan. You can find yaks here.
Yak is a unique animal. It looks like a cow but it has long hairs.
Yak feeds on green plants. You can see an yak grazing with Sonam standing in front of him.
Sonam takes his yak home in the evening and milks the yak.
Have you eaten anything made of yak's milk? We make cheese and butter out of yak's milk.
Sonam makes cheese out of the milk and cooks it with vegetables and green chillies.
Do you know any other uses of yak?
It is used for carrying load. You can see that Sonam has put a load on the yak's back.
Do you dry any meat at home? Here is yak's meat being dried.
Yak is a useful animal. We must take good care of yak.

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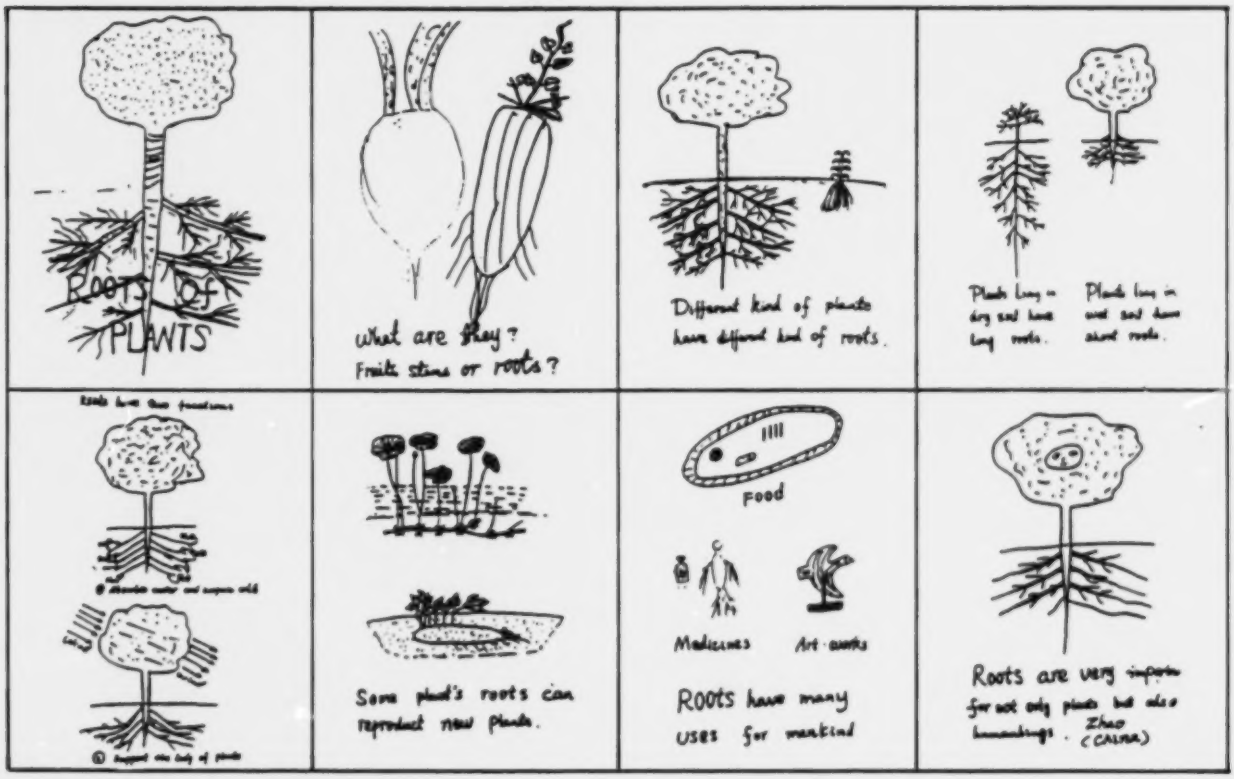
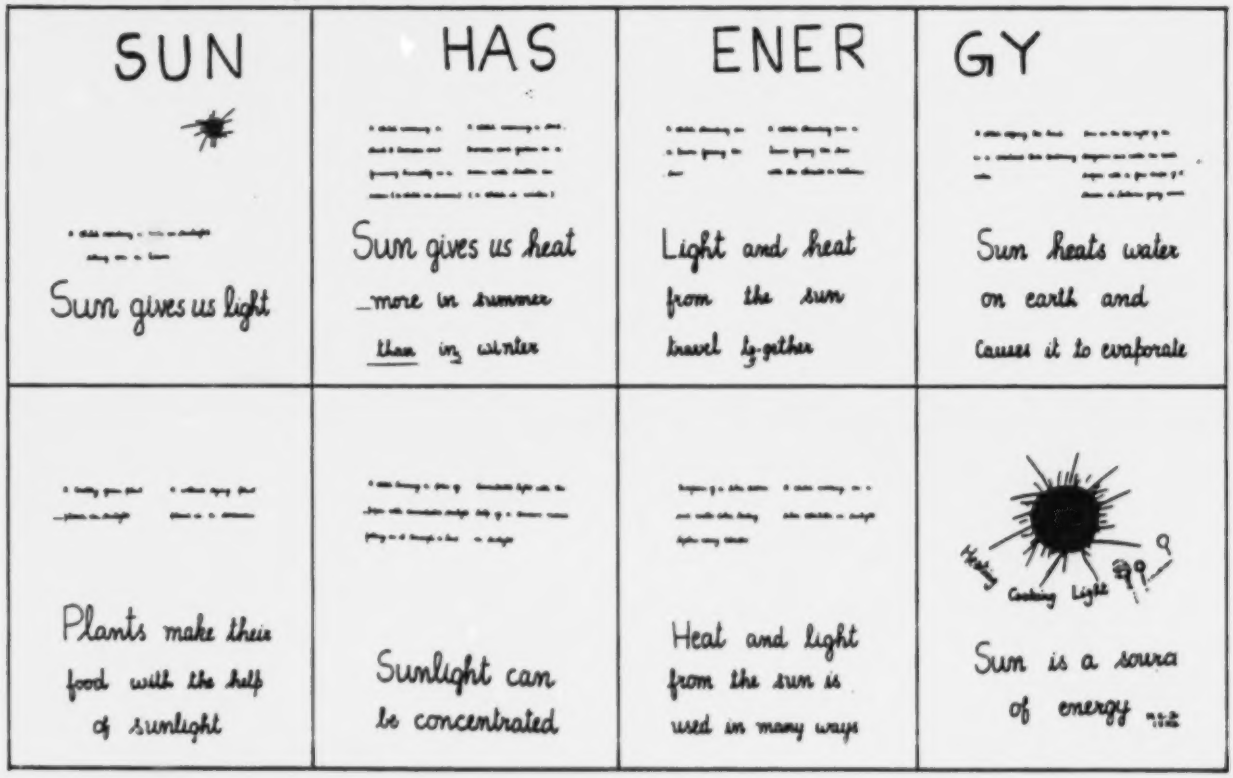
"ROOTS OF PLANTS" by Zhao Zhan Liang (China)


ROOTS OF PLANTS
What are they?
Fruits stems or roots?
Different kind of plants have different kind of roots.
Plants living in dry soil have long roots.
Plants living in wet soil have short roots.
Some plant's roots can reproduct new plants.
Food
Medicines
Art works
ROOTS have many uses for mankind
Roots are very important for not only plants but also humanbeings.
Zhao (CHINA)

"SUN HAS ENERGY" by H.C. Jain (India)



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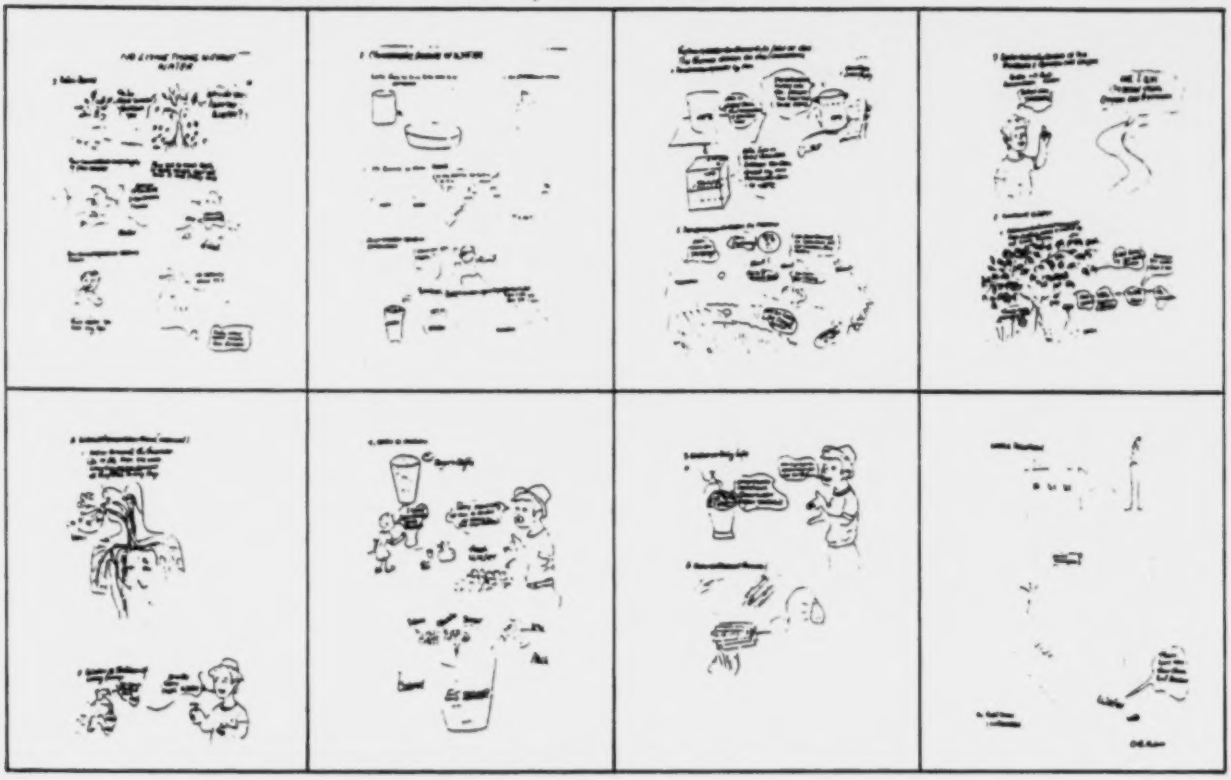
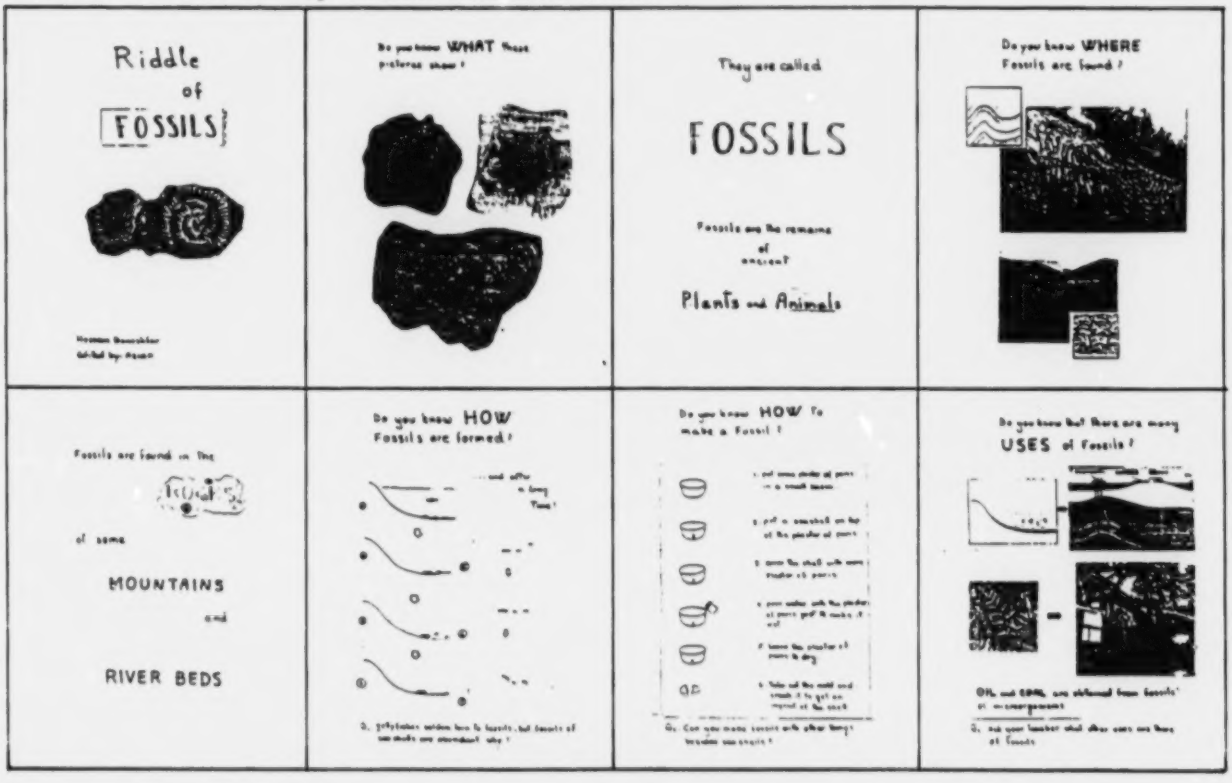
"NO LIVING THING WITHOUT WATER" by Saiful Muzani (Indonesia)



"RIDDLE OF FOSSILS" by Hossein Daneshfar (Iran)



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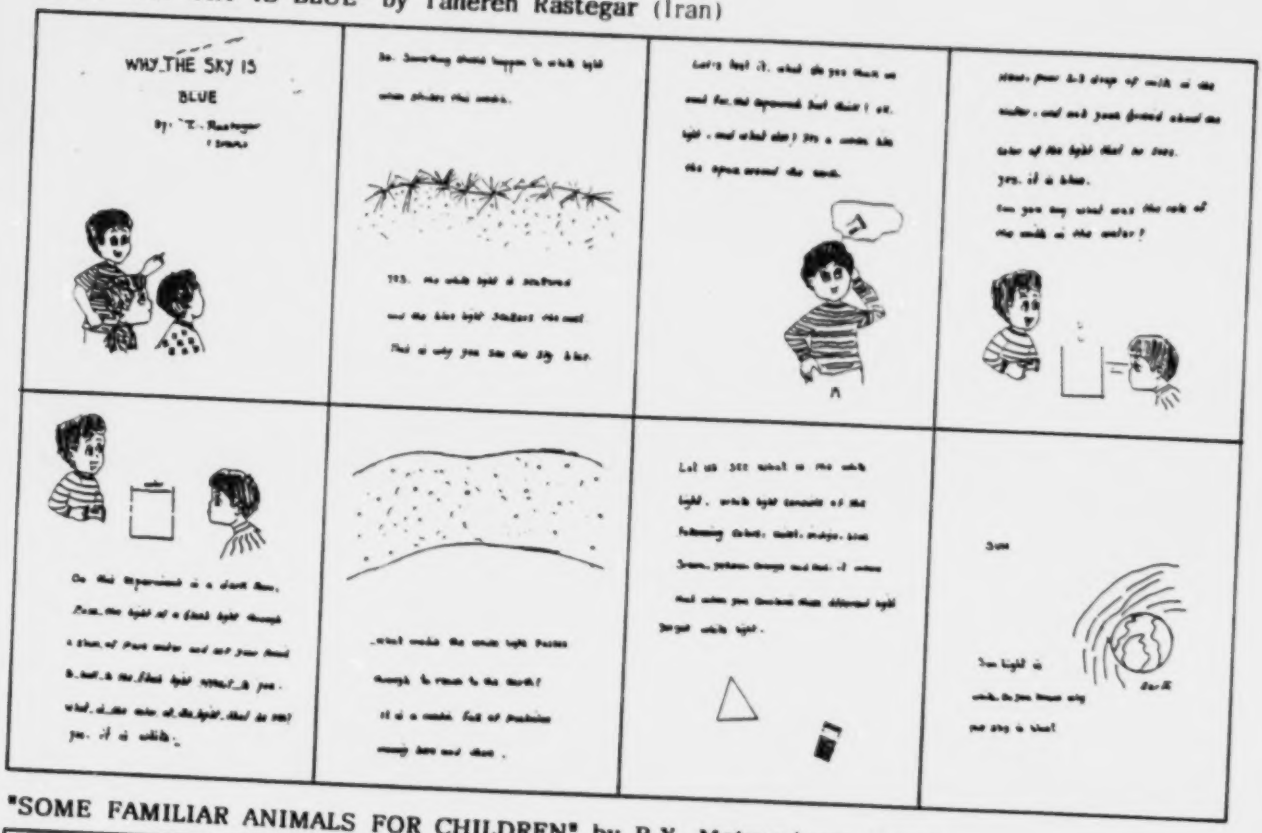
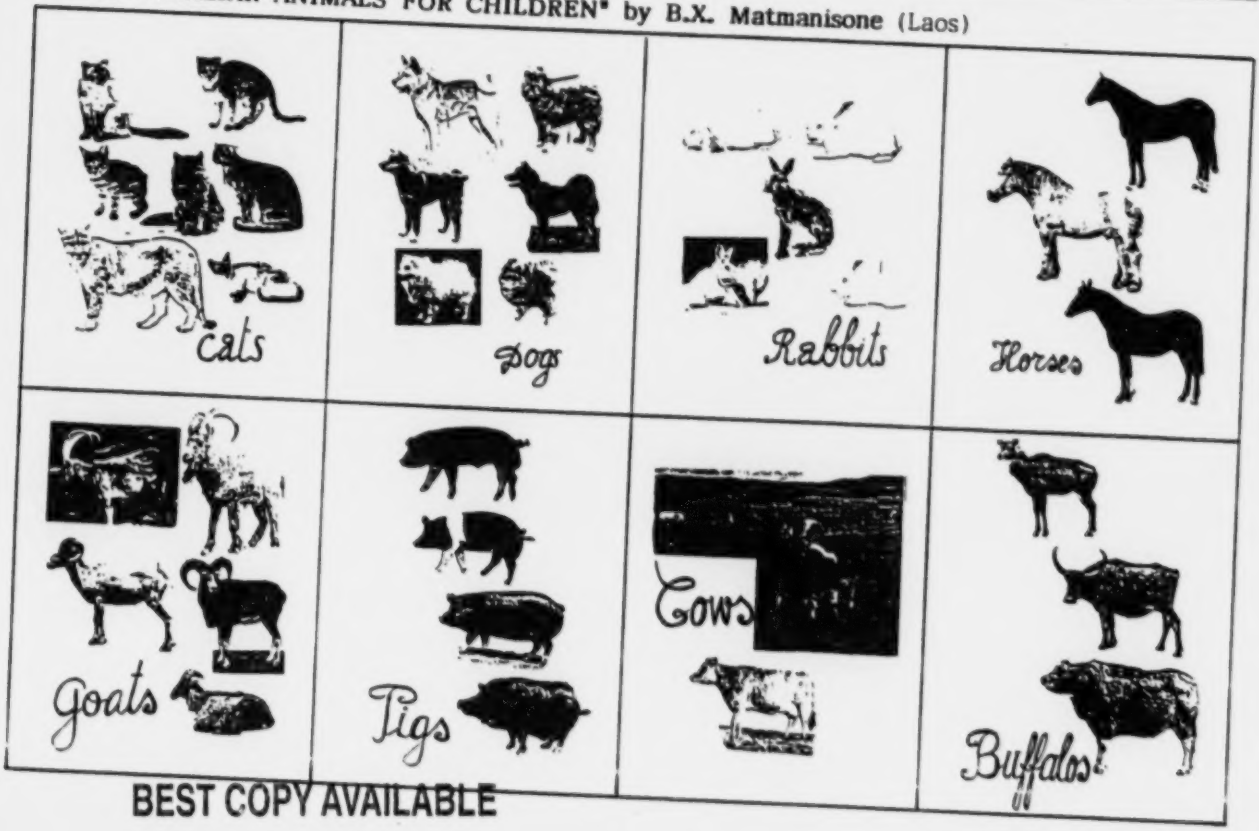
"WHY THE SKY IS BLUE" by Tahereh Rastegar (Iran)



"SOME FAMILIAR ANIMALS FOR CHILDREN" by B.X. Matmanisone (Laos)



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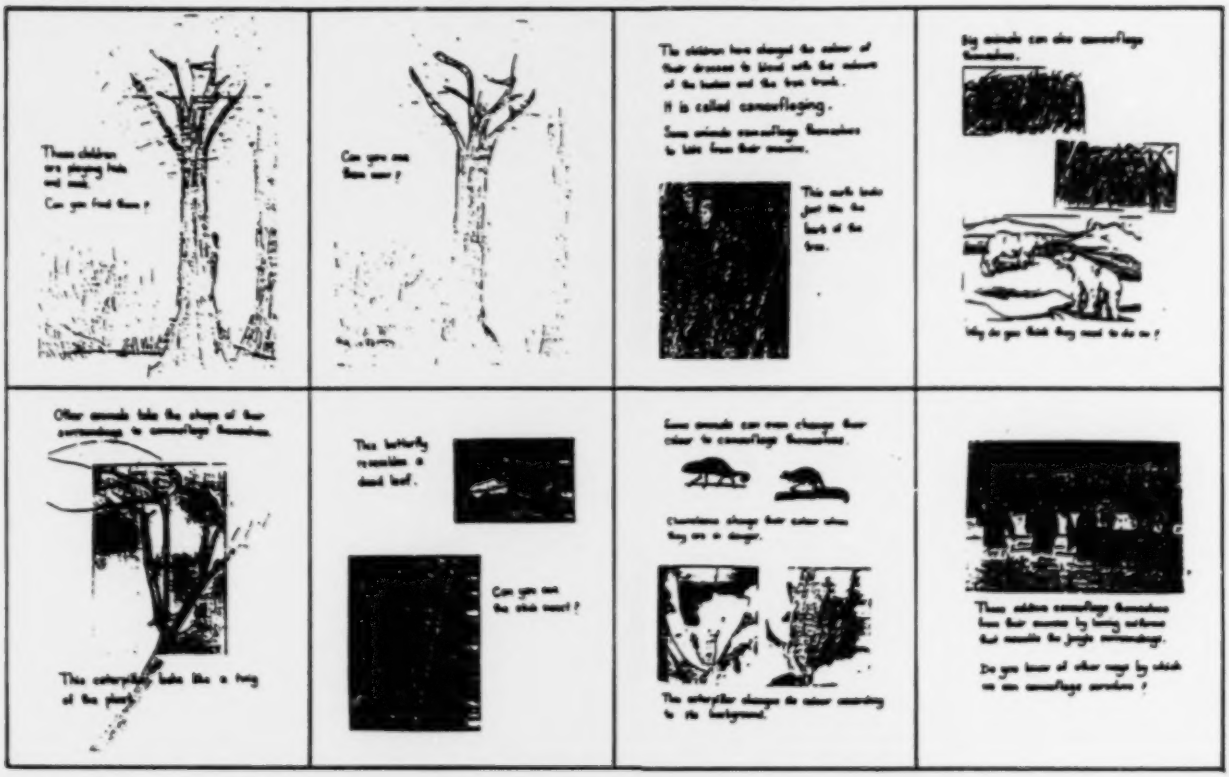
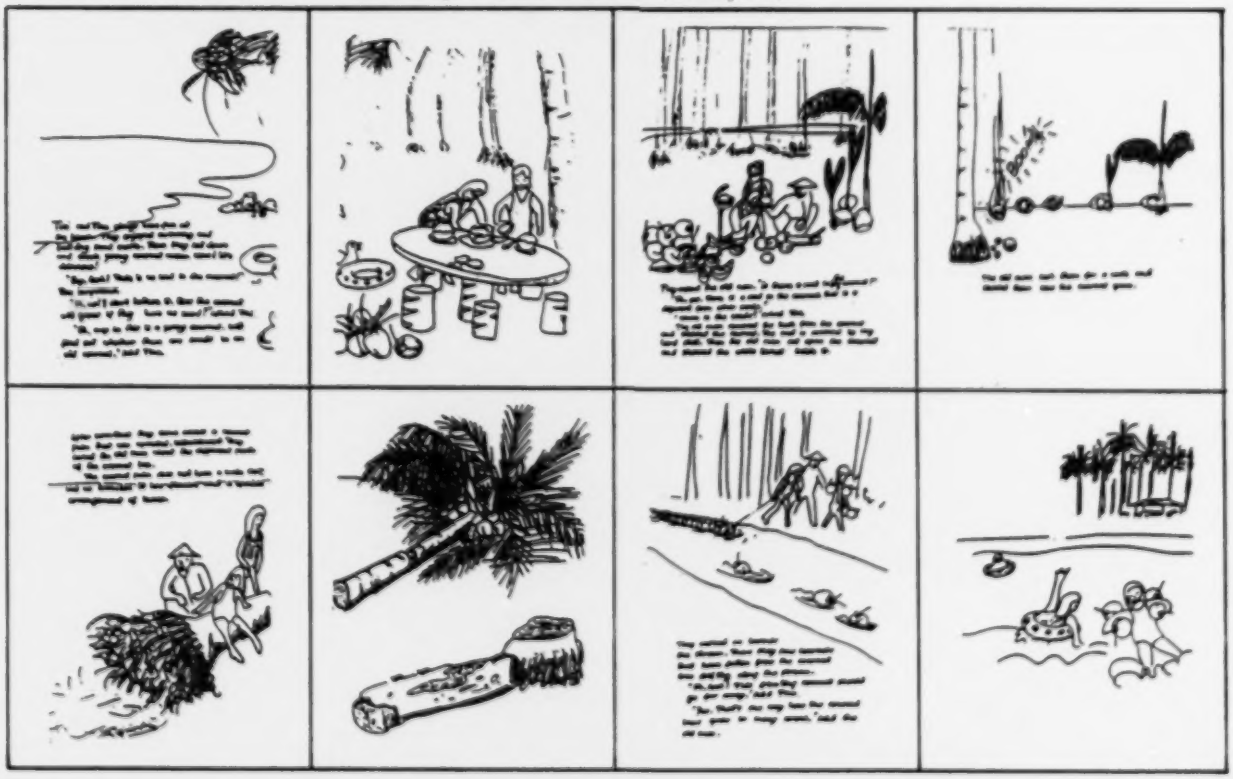
"CAMOUFLAGE IN ANIMALS" by Azian T.S. Abdullah (Malaysia)



"DOES COCONUT HAVE SEED?" by Arshad Rawian (Malaysia)



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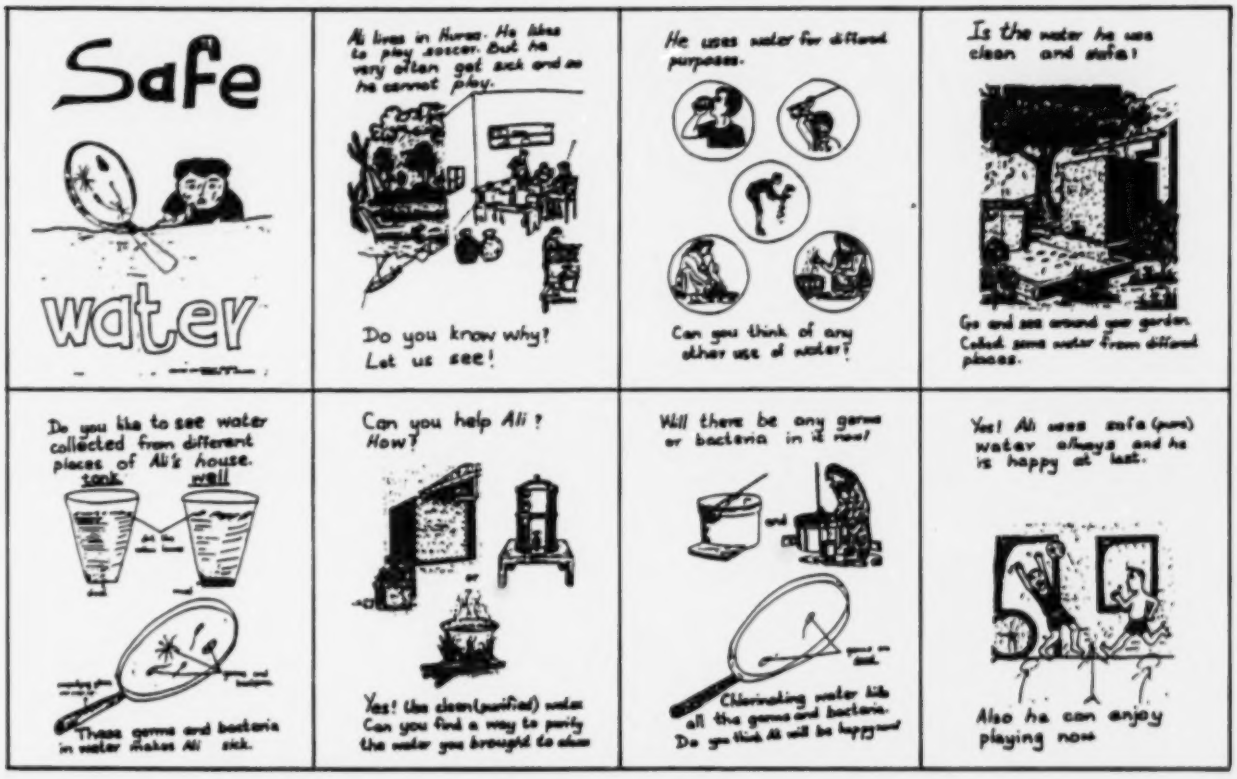
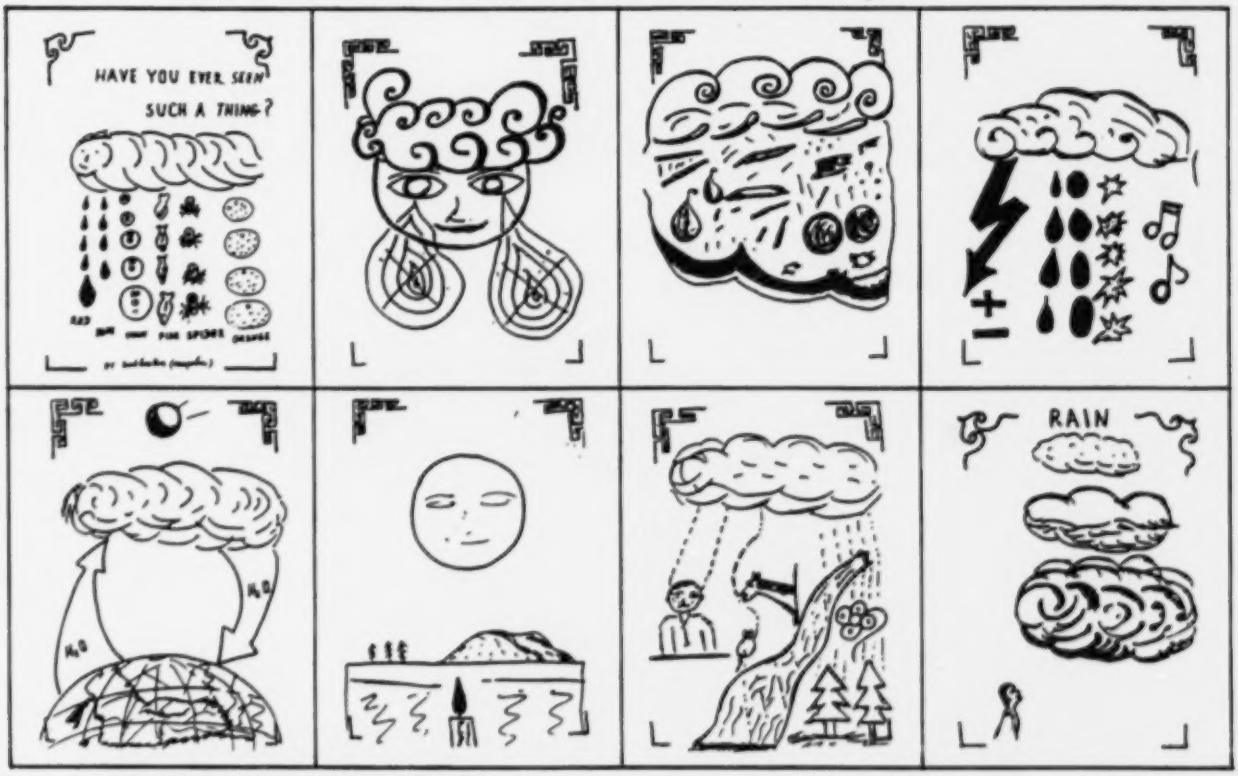
"SAFE WATER" by Hussain Haleem (Maldives)


Safe
water
Ali lives in Hurae. He likes to play soccer. But he very often get sick and so he cannot play.
Do you know why? Let us see!
He uses water for different purposes.
Can you think of any other use of water?
Is the water he uses clean and safe?
Go and see around your garden. Collect some water from different places.
Do you like to see water collected from different places of Ali's house.
tank
well
These germs and bacteria in water makes Ali sick.
Can you help Ali? How?
Yes! the clean(purified) water. Can you find a way to purify the water you brought to show
Will there be any germs or bacteria in it now?
Chlorinating water kills all the germs and bacteria. Do you think Ali will be happy now?
Yes! Ali uses safe (pure) water always and he is happy at last.
Also he can enjoy playing now

"HAVE YOU EVER SEEN SUCH A THING?" by N. Sukhbaatar (Mongolia)



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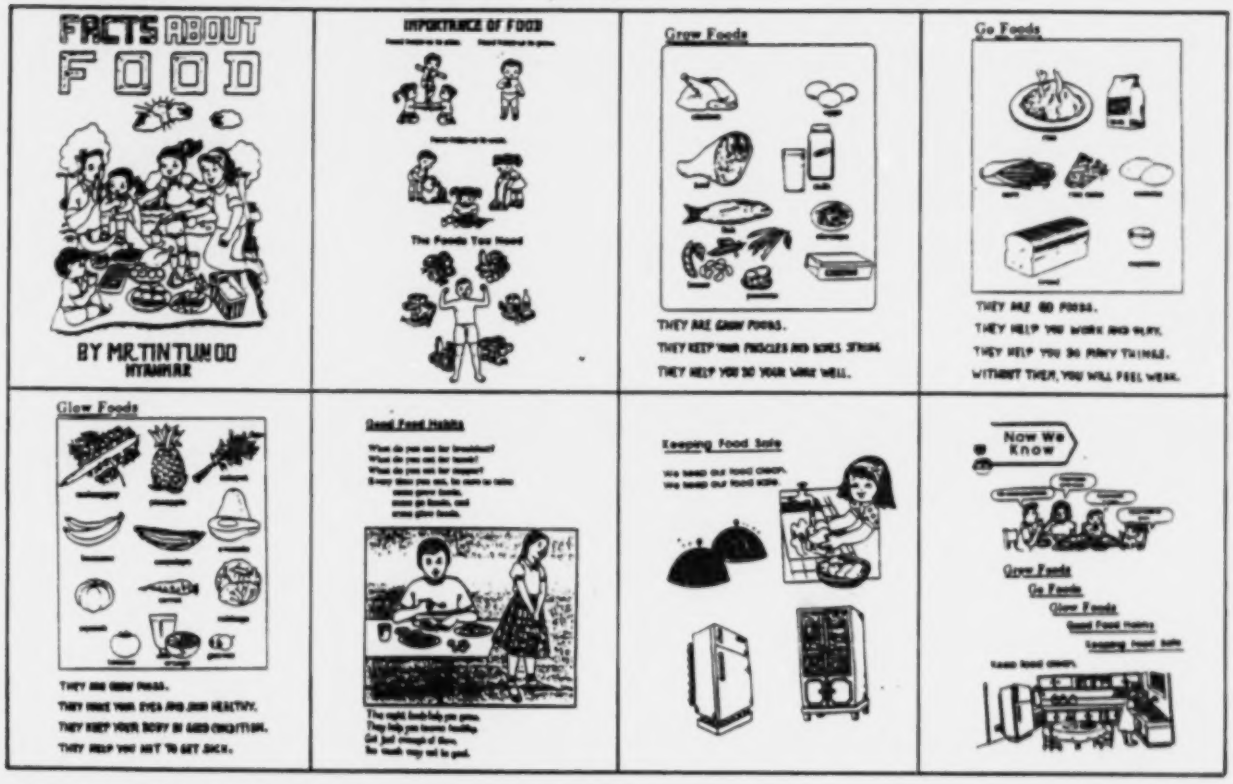
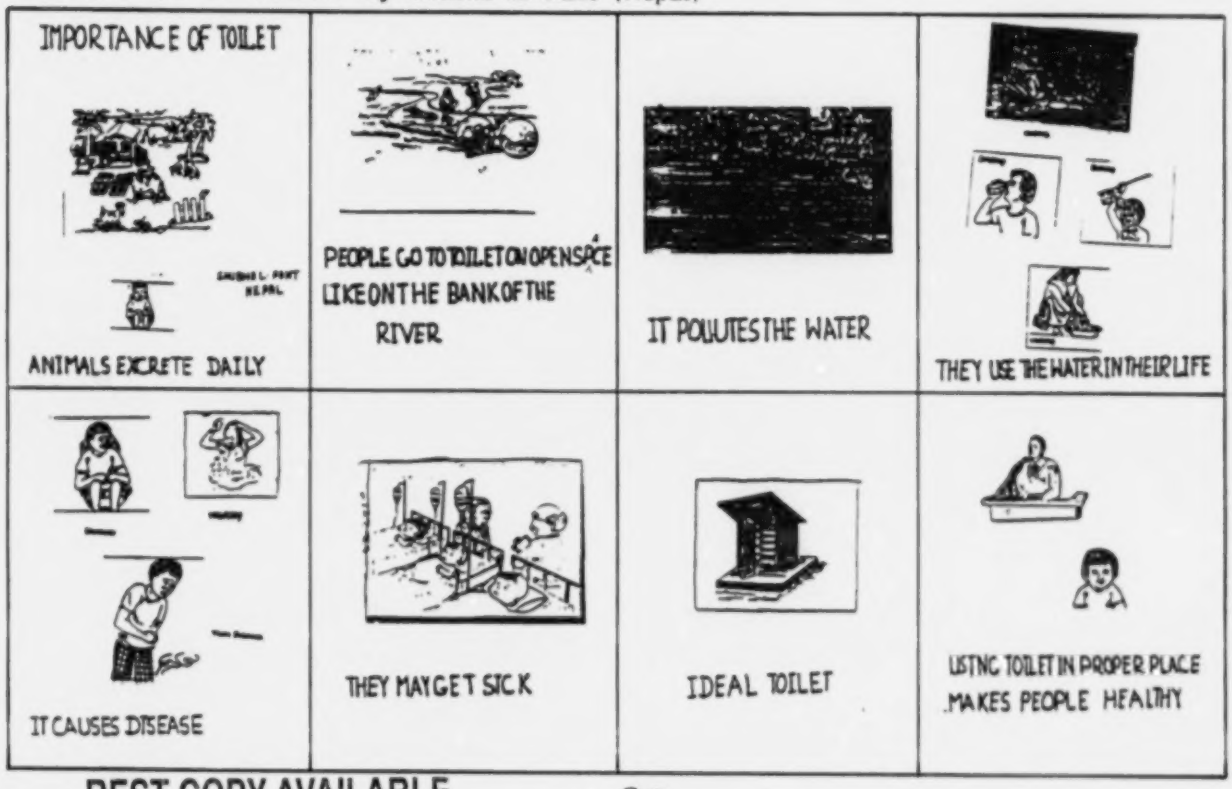
"FACTS ABOUT FOOD" by Tin Tun Oo (Myanmar)



"IMPORTANCE OF TOILET" by Shubha L. Pant (Nepal)



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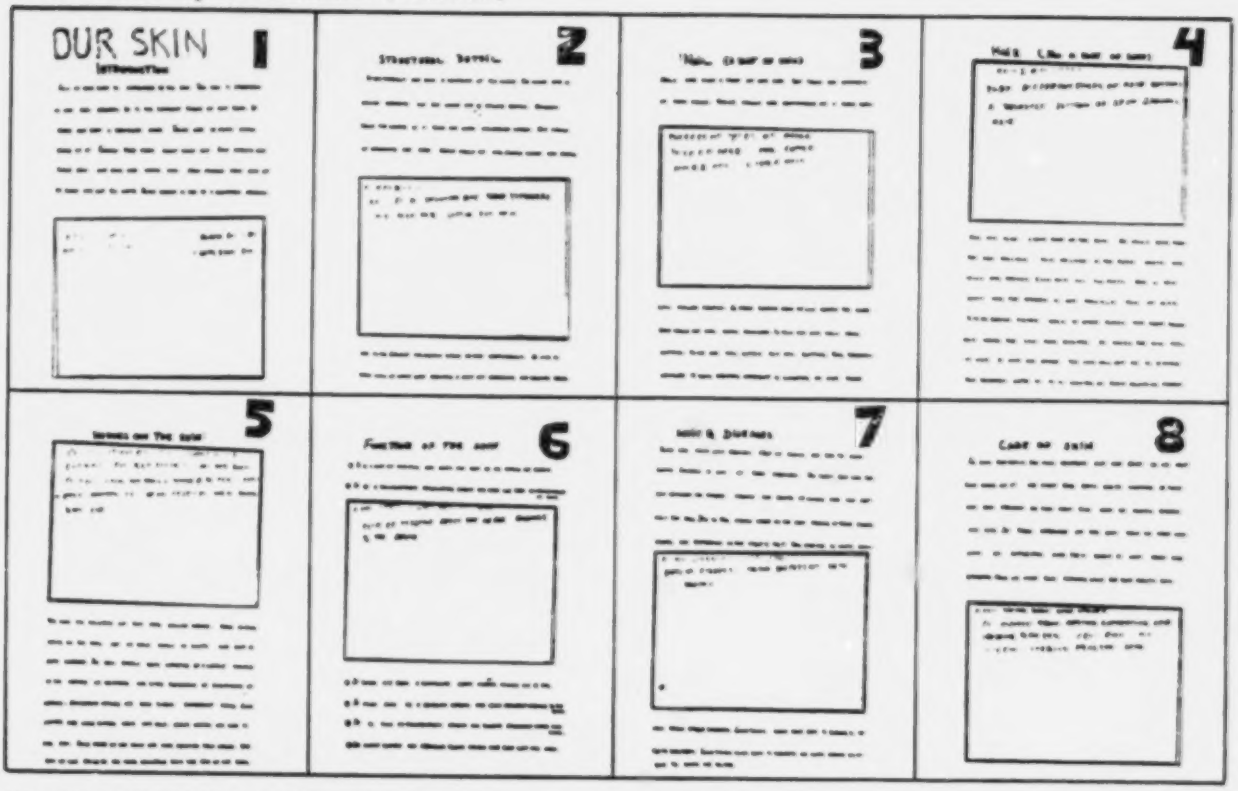
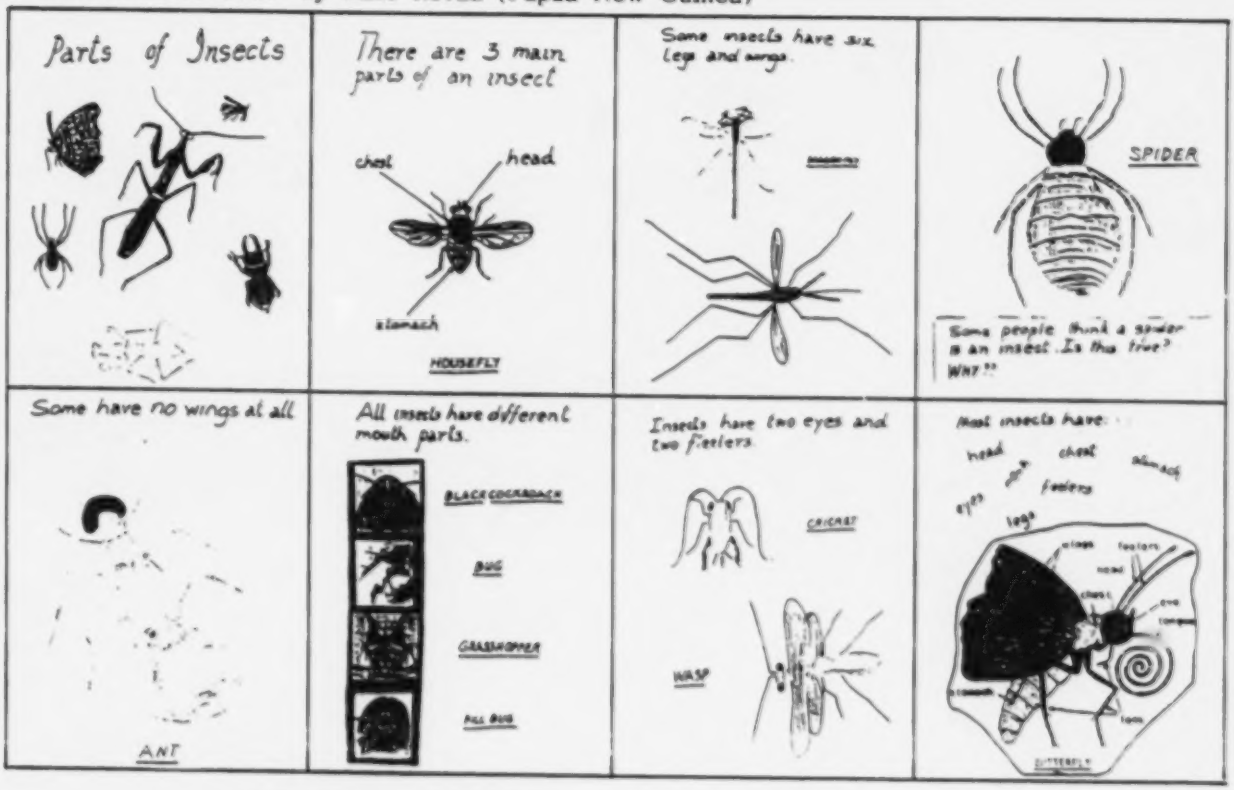
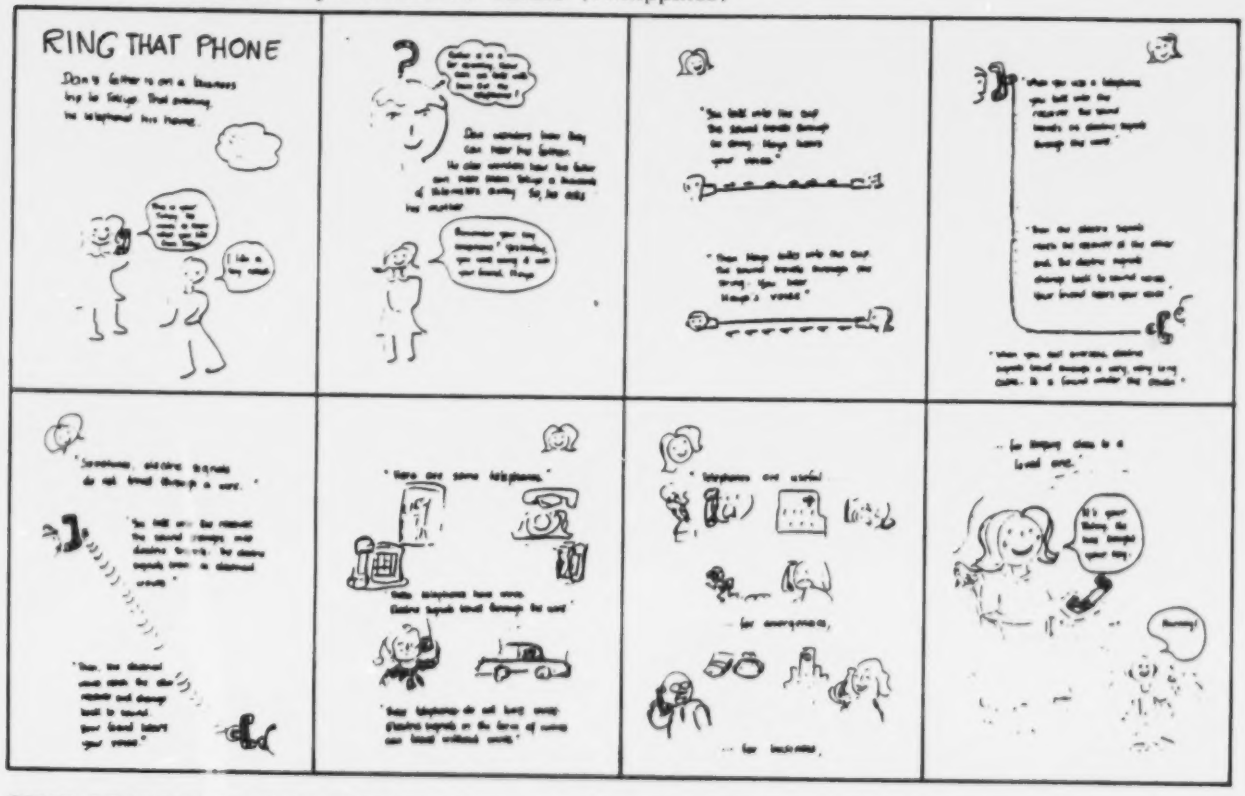
"OUR SKIN" by Jamil Ahmad (Pakistan)



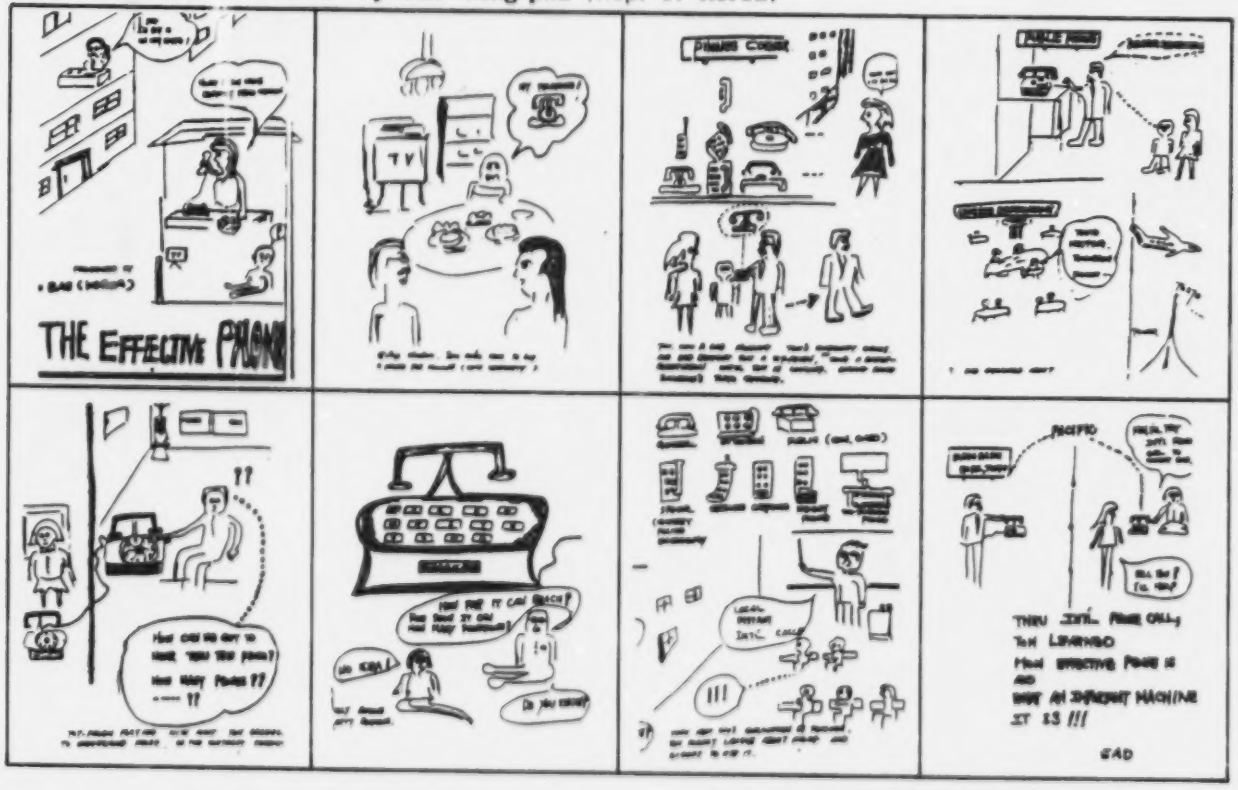
"PARTS OF INSECTS" by Raho Kevau (Papua New Guinea)



"RING THAT PHONE" by Lourdes R. Carale (Philippines)



"THE EFFECTIVE PHONE" by Bae Yong-pha (Rep. of Korea)



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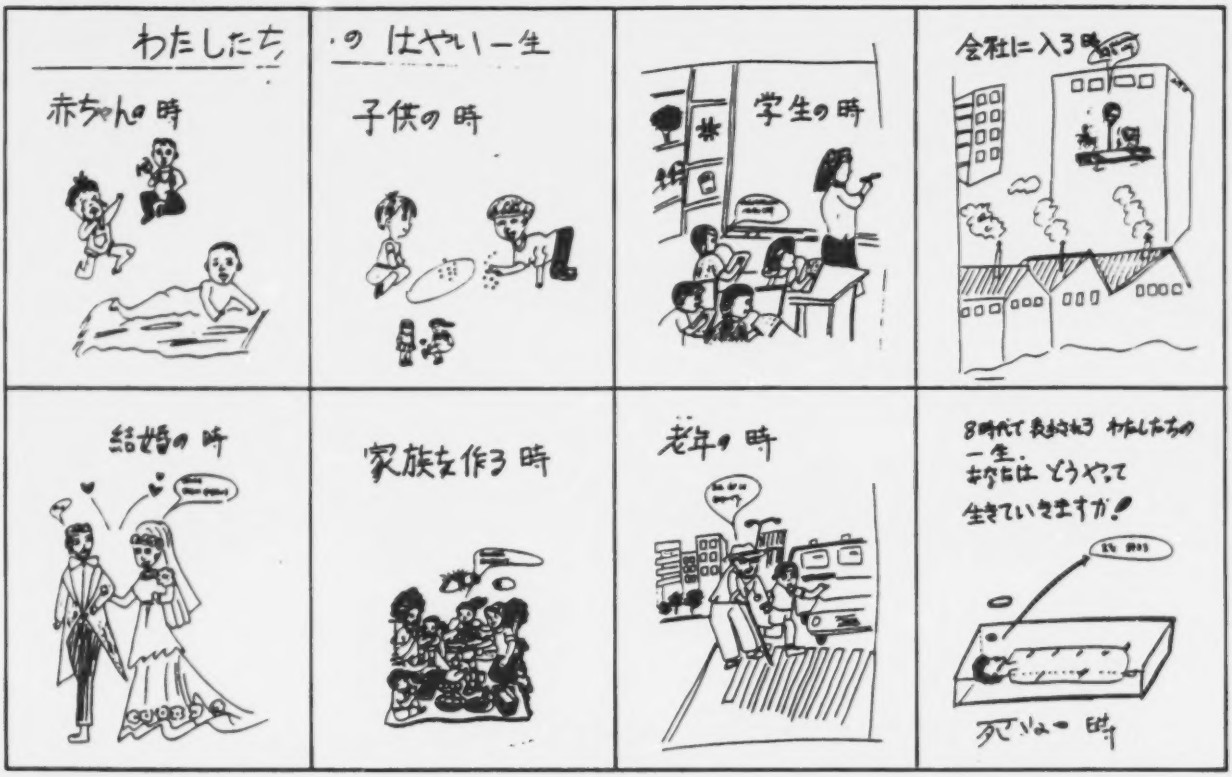
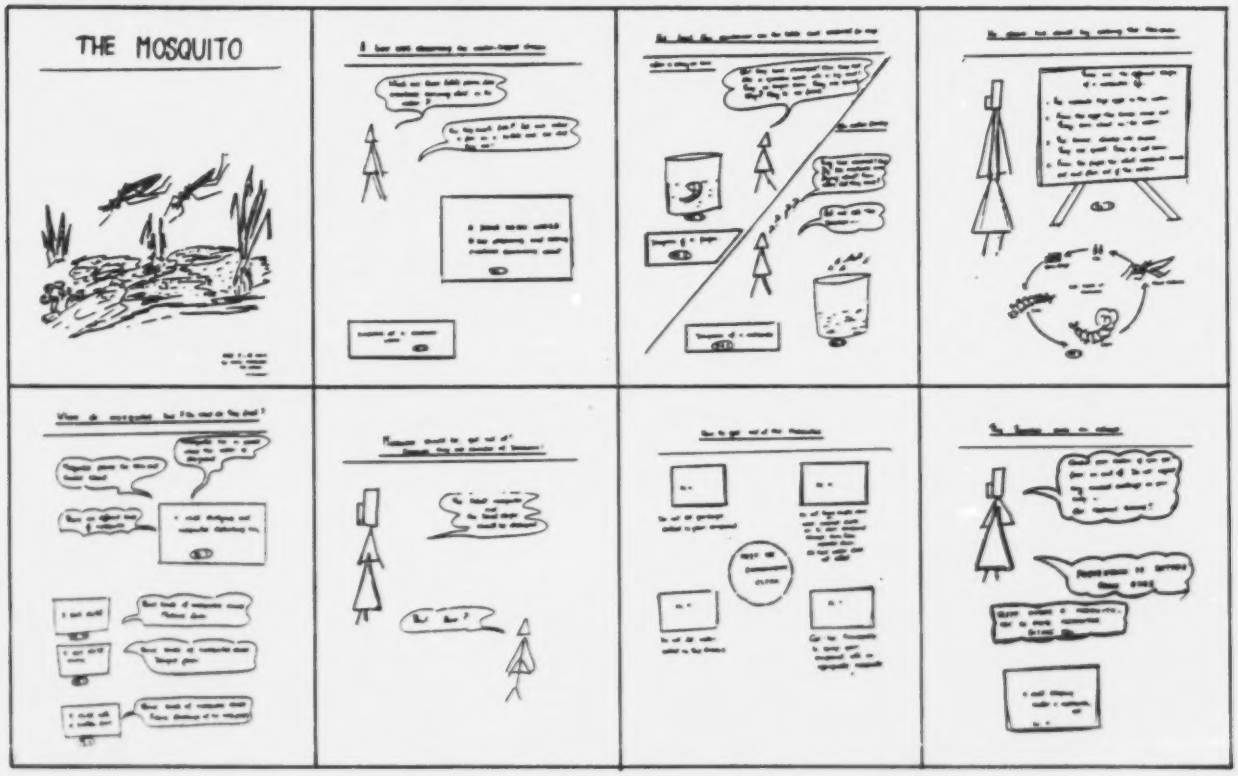
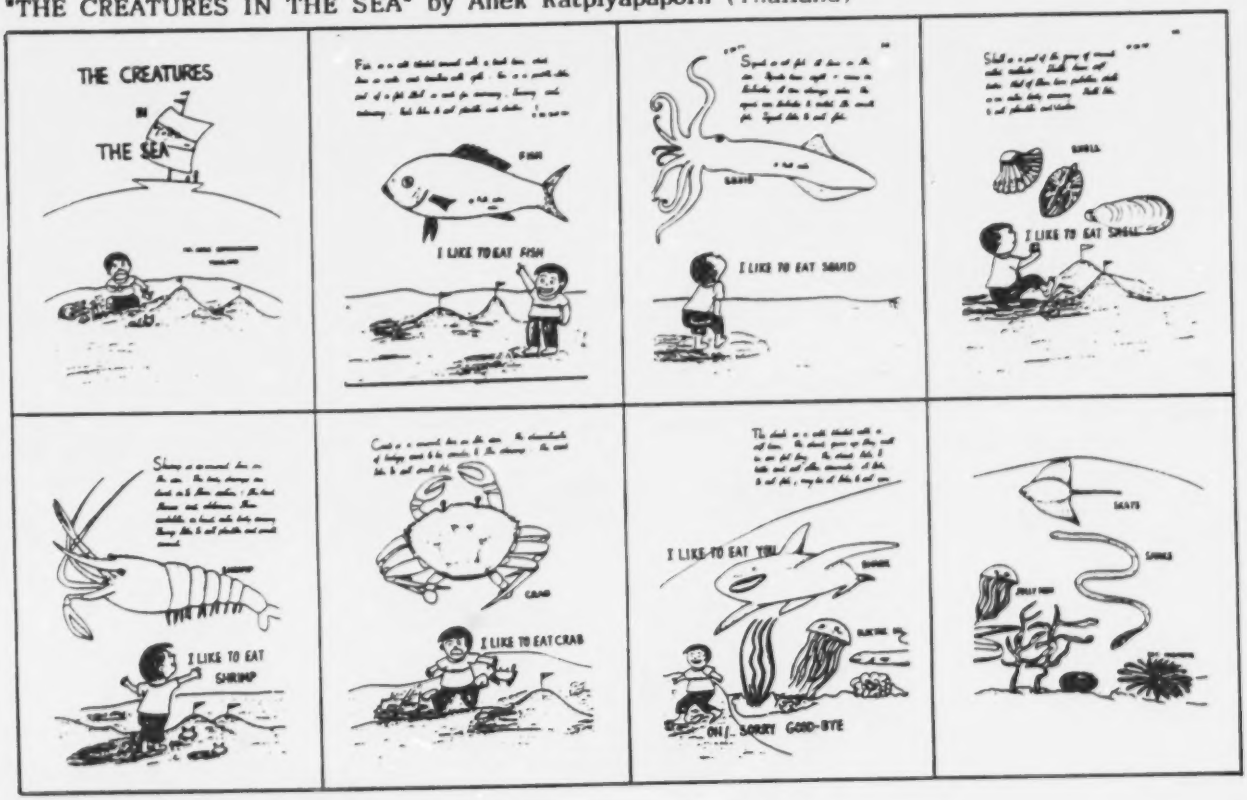
"OUR LIVES" by Lee Soun-duck (Rep. of Korea)



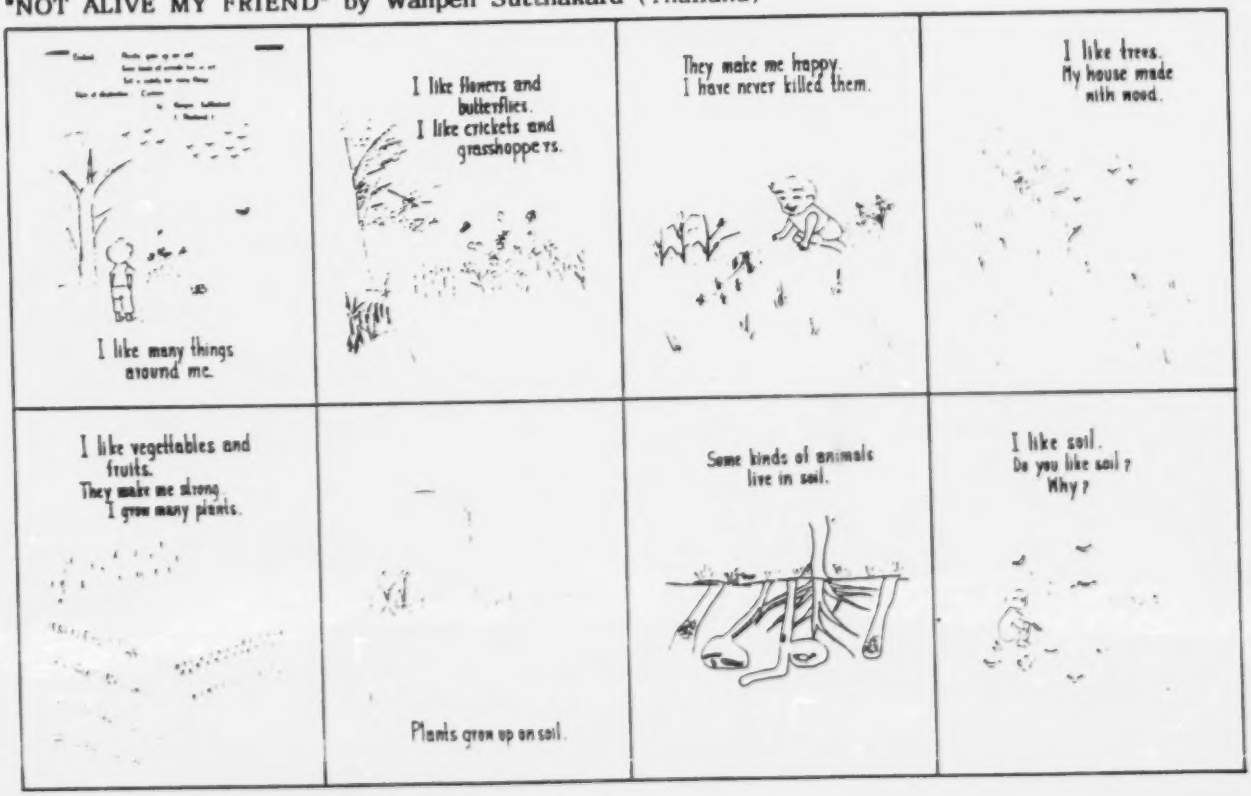
"THE MOSQUITO" by Vimal Siritunga (Sri Lanka)



"THE CREATURES IN THE SEA" by Anek Ratpiyapaporn (Thailand)



"NOT ALIVE MY FRIEND" by Wanpen Sutthakard (Thailand)


I like many things around me.
I like flowers and butterflies. I like crickets and grasshoppers.
They make me happy. I have never killed them.
I like trees. My house made with wood.
I like vegetables and fruits. They make me strong. I grow many plants.
Plants grow up on soil.
Some kinds of animals live in soil.
I like soil. Do you like soil? Why?

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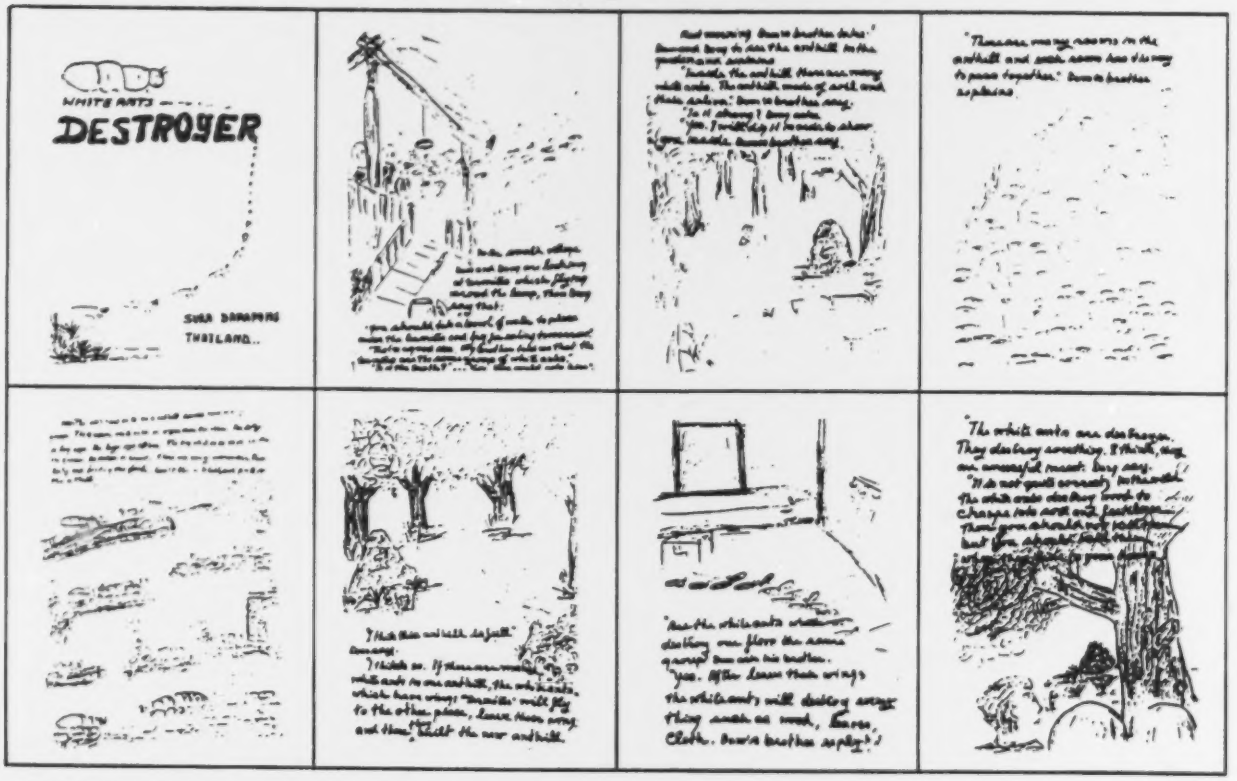
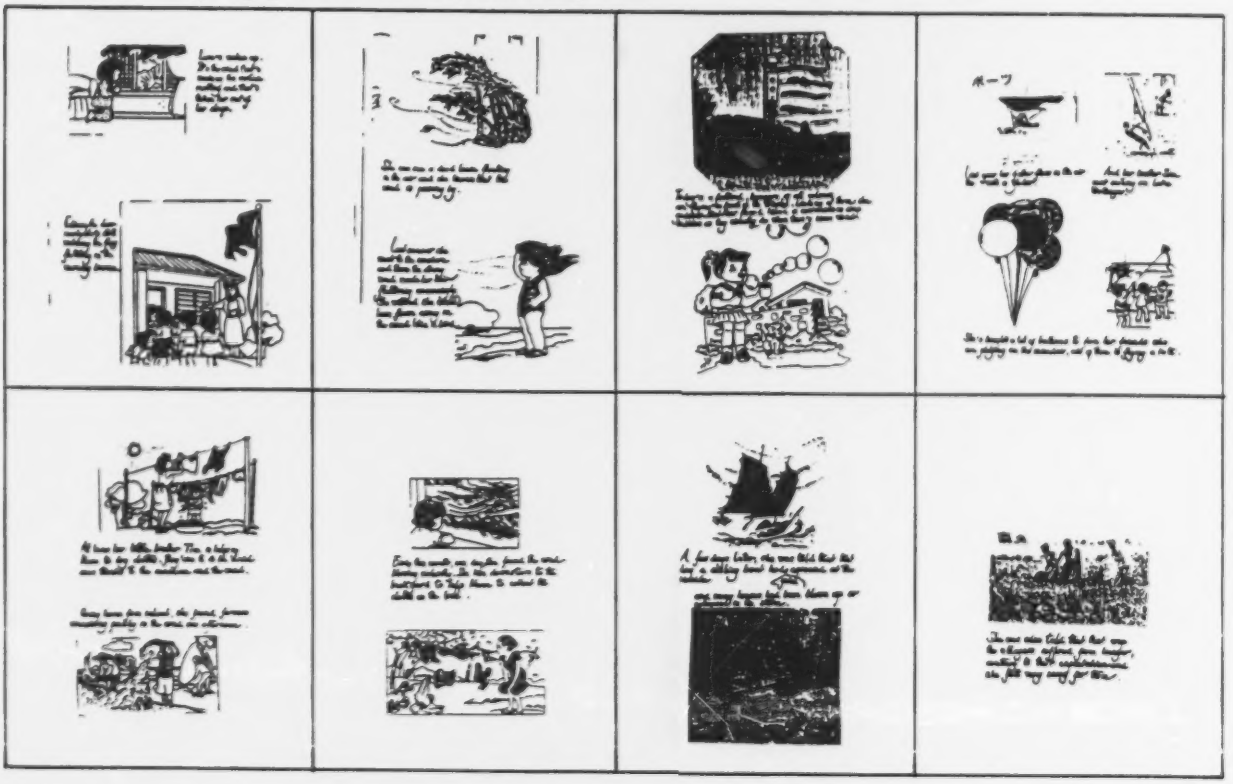
"WHITE ANTS, DESTROYER" by Sura Damapong (Thailand)



"THE WIND" by Nguyen Van Minh (Viet Nam)



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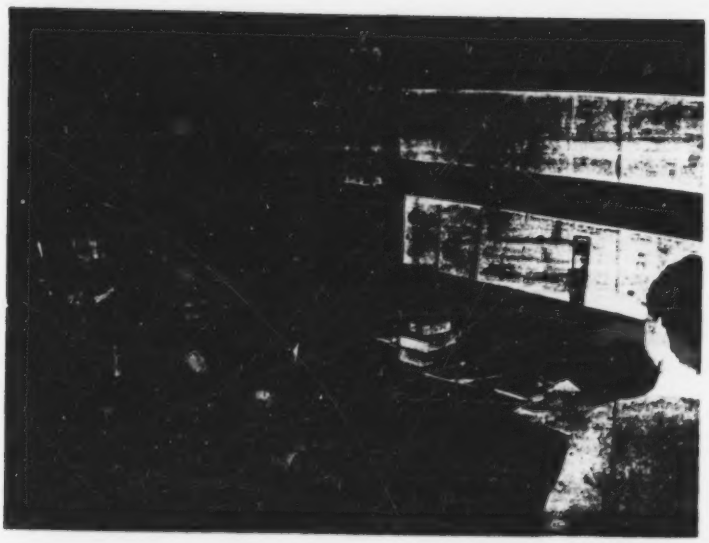

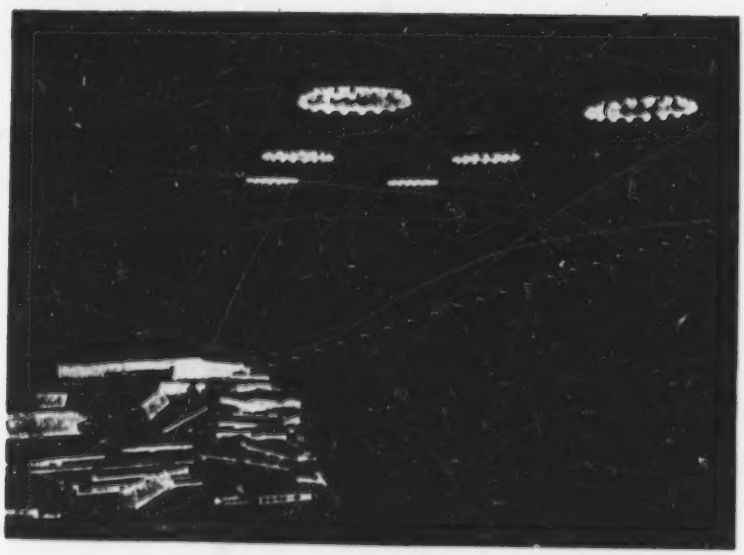

Participants presenting their science books

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II : PROBLEMS AND SOLUTIONS FOR PRODUCING PRIMARY SCIENCE BOOKS IN RESPECTIVE COUNTRIES – (Group Reports of NP-Method Sessions)

II: PRODUCTION OF PRIMARY SCIENCE BOOKS IN RESPECTIVE COUNTRIES: PROBLEMS AND SOLUTIONS
- (by New Participation Method data analysis)

WHAT IS NP-METHOD?

The New Participation Method (NP-Method) is a method of data analysis to identify needs, problems and solutions of all levels on the topic comprehensively and quickly, with the participation of all members.

Through actually writing the items down on small slips of paper which will later be pasted on a large sheet of paper, the members can understand the situation concretely and easily translate it into action.

PROCEDURE OF NP-METHOD

Participants are divided into small groups of six to seven persons.

(1) Firstly, the group members decide the topic and freely discuss problems of the topic for 30 min., freely without any referring to any material, to have some idea as to what items to bring up as important. At this stage all members should limit their talking time to within 3 min. each.

(2) Each person writes down 10 different items they can think of, on 10 slips of paper (3.5 cm X 10 cm). About 30 min. is given for writing and they should be written without referring to any material. The slips are the basis for a data map, so they should be written in the following manner:

a) Simply and in short sentences;
b) Content clear and practical;
c) Easily understood by everybody.

(3) Then, Each person reads out what he/she has written in the group in turn and others listen to the content of the items. The slips are then grouped according to their similarity, and then content of all items raised are summarized into a sentence for each category. All slips are pasted on a large sheet of paper and the content summary is written down at the top of each category. It is a kind of data map which helps to understand the situation and to proceed to the next step, e.g. solutions.

(4) For instance, you can make a data map on 'problems', based on which you can follow the same procedure for the 'solutions' and then your 'practical actions'. This method has proved very effective for identifying needs and problems in the past ACCU literacy workshops and training courses.

NECESSARY MATERIALS FOR NP-METHOD

a) large sheet of paper (100cm X 100cm)
b) small slips of paper (3.5cm X 10cm)
(10 slips X 7 persons) for one group
c) paste
d) felt pens or markers of different colours (to write down summary)
e) ballpoint pens or pencils

(1) Group-A Report

Problems and Needs concerning the Production of Science Books for Children

MEMBERS OF GROUP A

Mr. Saiful Muzani (Indonesia)
Mr. N. Sukhbaatar (Mongolia)
Ms. Maina Kumari Kharga (Bhutan)
Ms. Azian bt. T.S. Abdullah (Malaysia)
Mr. Sura Damapong (Thailand)
Mr. Nguyen Van Minh (Vietnam)
Mr. Shinji Tajima (ACCU)

NEEDS AND PROBLEMS IDENTIFIED

The countries represented in Group A are Bhutan, Indonesia, Malaysia, Mongolia, Thailand, and Viet Nam.

Our countries can be classified as developing countries and we do face lots of problems in the process of producing science books for children. In Bhutan, for example, we don't have any science magazines for children at all. We categorized our science books into two types, i.e. the text books and supplementary books which include magazines.

Roughly speaking, the problems and needs are classified into four main areas. These problems may differ from one country to another in terms of seriousness, but we found them to be common in the countries represented. The problems put forward are personal opinions and not those of the authorities in the various countries.

The problems are;

1) Lack of good writers, illustrators, photographers, editors and other personnel involved in producing science books
2) Shortage of funds
3) Poor quality of printing
4) Ineffective system of book distribution

1) Lack of Good Writers, illustrators, photographers, editors and other personnel involved in producing science books

It was agreed by everyone in the group that in all the countries involved, shortage of qualified and skilled manpower in writing, illustrating, laying out the book, taking good pictures and editing is the major problem in producing good science books for children.

It was felt that even if the countries have people to do the above jobs, these people are not creative enough to ensure a good output; not that they are to blame, but it is obvious that they have not had sufficient training to be competent enough to do the above job. In addition, the writers face a lot of difficulties in not having enough resource materials like journals and periodicals that they can consult for the emerging trends and issues of curriculum development.

There is always the problem of finding people to write science books for young children as most people regard this job as a non-prestigious one. If university lecturers are employed, there is a danger that they may not be able to come down to the cognitive level of young children in developing the science books. At the same time it is very difficult to expect young people with only primary education experience to write the books for the reason mentioned above.

It was also felt that cooperation between editors, writers, illustrators and designers was lacking during the production of books.

2) Shortage of funds

A manuscript, after long-term of preparation by various specialists at different stages must be put into effect, i.e. it must be published for circulation. In this respect a lot of money is needed to cover all the expenses : from the buying of paper to the payment for those who have created it and moreover for those who are going to have it printed and bound. Such a large sum of money must be invested by an organization or an individual with considerable financial resources who is willing to undertake such a venture. But where such a great quantity of newsprint, and such a tremendous loan for implementation can be found remains a question that is difficult to answer if not in some cases impossible. This is true in the case of Viet Nam.

Some countries have very few publishing facilities. In others, there is a shortage of funds to buy quality paper. Full colour is not encouraged in science books because the price of the books will increase, especially science text books. The textbooks are provided on a loan basis to the pupils and the government

pays for them.

3) Poor quality of printing

In this respect, the printing of books is not very good due either to outdated technology or poor quality paper. In Malaysia, the quality of printing is good but in some of the other countries, it is a very serious problem.

4) Ineffective system of book distribution

A book, once it has come into existence cannot lie idle somewhere in the storehouses of the printing works or of the publishers. On the contrary, it must be put into circulation as fast and as widely as possible. Most of the books are usually found in big cities and towns but they are inaccessible to children in the rural and remote areas.

People in the Third World are in general rather poor or earn low incomes, especially those who live in rural or mountainous regions. So scientific books are not, for most of them, items of daily need. Sometimes they buy one at random or by chance, not on purpose. As a result, if a scientific book or magazine is cheap, i.e., if it does not consume a noticeable part of their family budget, they may get it without hesitation with no worry about the matter of food or clothing for their little ones in days to come. And yet, while the burden of necessities is still lying heavily on their shoulders they must decide whether to buy or not.

Here, there is a vicious circle: no books to read means that there will be no reading habit, no reading habit in turn means that there is never a need for them to buy books.

Some countries do get book aids from developed countries, eg. Asia Foundation, but on the whole it is not equally distributed.

In conclusion, we do not know whether our problems and needs can be solved but with the help of the many agencies such as UNDP and UNESCO, we hope something can be done.

Solutions to the Problems Identified

Among the problems that were identified by the group, the most pertinent problem was lack of good writers, illustrators, photographers, editors and other personnel involved in producing science books.

Some of the solutions suggested by the members are:

a) Training of Personnel Involved in Producing Science Books

More writers, illustrators, photographers, layout designers and editors should be trained either before they enter the service or during the course of their work. All new personnel, especially editors, should undergo some sort of pre-service training course. Good editors are those who are able to plan and coordinate work done by all those involved in producing the books.

All personnel should also be sent for in-service training which includes seminars and workshops at the regional, national and international level. Overseas study tours should also be conducted for them to enable these personnel to exchange information with their foreign counterparts and also to broaden their perspectives.

Some countries might not be able to do that due to lack of funds. Therefore, agencies such as Unesco and UNDP could help by funding training courses, seminars, workshops and study tours for these people. Writers who have a flair for illustrating and photography should be further trained so that they can become multi-skilled writers.

More translators should be trained and a national association should be set up in every country for this purpose. In this way, there will be a good coordinating body to translate foreign books into the native languages.

The Ministry of Education should also make sure that primary teachers are trained to use the science books effectively and are skilled enough to conduct scientific activities suggested in the books.

b) Motivating Personnel with High Monetary Incentives

People who have a talent for writing, illustrating and taking good photographs should be encouraged and motivated by giving high monetary incentives or royalties. Without these, people who are able to write and illustrate will not be willing to do the job.

In order to write books for primary

children, writers must have teaching experience at primary level specifically. Therefore, they should be encouraged to write books for primary children with high monetary incentives.

c) Providing Relevant Resource Material and Resource Persons

All good science book writers need resource materials which are up-to-date and informative. This can be achieved by making the libraries accessible to these writers. Publishers should also obtain more journals, periodicals, magazines and imported books for their writers' reference.

A clearing house has to be established at the national and international level by certain agencies to enable writers to obtain resource materials easily. Good photographs can also be made available by the clearing house to enable publishers to produce good picture science books. Photographing facilities should also be made available to writers.

Primary teachers who write science books for children may need university professors as their advisors or co-writers. These resource persons should be invited to help the writers especially in conducting research on the science content and activities to be included in the books. It would be good if publishers could provide laboratories for science writers to conduct new experiments.

d) Conducting a Needs Assessment Survey and Determining the Objectives of the Book

Good writers and editors will always conduct a needs assessment survey to determine the kinds of science books needed by the local community. They should also conduct visits to primary schools to see how the science lessons are being taught by the teachers and from there, the objectives of the science books can then be determined.

Writers and editors who do not conduct surveys may not be able to have a clear picture of the situations in the local community and thus will not produce good science books.

e) Giving Ample Time to Write

A good writer needs ample time to write a good science book. Research (either literature research or other) is usually necessary before a book can be written.

Writers should not be burdened with the extra tasks of editing and other duties. This is especially true of science textbook writers who are attached to the Ministry of Education. If the writer is given ample time to concentrate on his or her task without other commitments, then he or she may be able to produce a good science book.

If writers are given ample time to write, they will be able to include interesting activities for the pupils such as games and puzzles, which take time to devise. Science books written in the inquiry mode with lots of activities take longer to prepare, but the end result is better because it enables the pupils to think, not only to memorize scientific facts.

f) Field-testing of the Manuscript

I order to produce science books, the manuscripts should be sent to parents, teachers and pupils to determine their feasibility. This kind of evaluation is important to improve the quality of the science books. This is one of the important tasks of a good editor.

CONCLUSION

The solutions suggested above can be carried out effectively if there is no shortage of funds. Publishers should take part in book fairs to attract local and foreign investments. Financial assistance could be sought from the government especially for the small publishers.

The Ministry of Education could invite private publishers to publish the science text books to improve their quality. Evaluators could be trained by the Ministry to ensure the standardization and uniformity of the science text books. In this way, the government could control the prices of the science text books while ensuring their quality.

Good writers and illustrators alone cannot determine the popularity of the science books among the children. If the general public is not aware of the importance of science, they will not buy science books for their children. Therefore, it is most necessary to create a science and technology culture to enable our children to enjoy science books.

(2) Group-B Report

Problems and Needs on Producing Science Books for Children

MEMBERS OF GROUP B

Ms. Vimal K. C. Siritunga (Sri Lanka)
Mr. Hussain Haleem (Maldives)
Ms. Tahereh Rastegar (Iran)
Mr. Raho Kevau (Papua New Guinea)
Mr. Anek Ratpiyapaporn (Thailand)
Mr. Chittaranjan Saha (Bangladesh)
Ms. Mieko Tase (ACCU)

PROBLEMS AND NEEDS

The following are the problems and needs of science book production for children as identified by the members of Group B.

1) Lack of professional skills for publishing

Lack of professionalism among the writers, editors, illustrators and printers was found to be the most dominant problem among all the countries. The writers and editors in almost all the countries are academically highly qualified. But, the majority of them lack the professional skills of writing, editing and publishing science books. They are not trained professionally in these fields. Most of them have acquired the skills and knowledge through experience over the years. They are not exposed to the modern techniques of book production in other developed countries.

2) Lack of illustrators

Almost all the countries lack competent professional illustrators and designers for science books, where illustrations are of vital importance in making the book more effective and also attractive. This seems to be a great drawback in producing science books of high quality.

3) Limitations in the availability of reference material (for teachers, writers, editors and students)

All the countries expressed their views on the limitations they face regarding the reference material on contents as well as methodology of teaching, writing, editing and publishing. The teachers and the writers need to have a very good knowledge of the respective subjects they are expected to teach or write about. Hence the need for relevant reference material is an urgent one which has to be fulfilled with no delay if better quality books are to be produced for the students.

At present, in all these countries, rapid progressive measures are being taken either for the development or revision of the curriculum, teacher-guides and text books. Thus the need for such reference material is very great.

4) Lack of professional cooperation among the teachers, writers, editors, curriculum developers, illustrators, printers and publishers

Good quality science books for children must provide accurate information; they should be readable and entertaining. However in many of the countries this cannot be attained because of the lack of professional coordination and cooperation amongst the various personnel involved in the development and production of books. The lack of cooperation and professional relationships amongst this pool of human resources curtails team work, which results in less effective or poor quality books.

5) Time limitation in the production books

The writers, editors, illustrators and printers in most of these countries are compelled to produce books within a restricted period of time. For example text books have to be written and produced within a year. Writers who are not professionally trained and are working with limited resources find it difficult to do a good job of work under such circumstances. This invariably results in the production of low quality books. However under the present conditions prevailing in these countries writing of text books within a short period of time seems to be unavoidable.

6) Difficulty in writing for different target groups

Most of these countries are less-developed. Therefore different areas within the country differ to a great extent socio-economically. They may also differ in their culture as well as geographically. Since the textbook production in all these countries is centralised, there is a need for the textbook to cater to the target groups of the entire country. This again is a heavy burden on the textbook producer. The needs of the student

population in the remote areas often seem to be neglected during this process.

7) Difficulty in using scientific technical terms

Very often in these countries the scientific technical terms are translated into the vernacular language of the country. These terms are not used in the common vocabulary. Thus the science technical terms in the text make it difficult for the student to understand the contents.

8) Non-availability of modern technology

Non-availability of modern scientific technology in editing, designing and printing is found to be a common problem prevalent in all the countries.

9) Financial constraints

Financial constraints in almost all the countries result in the production of poor quality books on science. Non-availability of funds limits the usage of quality paper which results in illustrations being limited to line diagrams of a single colour. Constraints on the use of colours because of high production costs results in less effective science books.

10) Lack of field-testing and evaluation of the textbook prior to printing

It was revealed that no field-testing is done at the manuscript level to check or test the validity, reliability or the acceptability of the activities as well as the text as a whole in any of these countries. This is a serious drawback and it does not help the editorial staff to gather any feed back from the students nor the teachers. Therefore there is no opportunity to make any improvement on the text.

11) Inefficient distribution

Most countries in the group experience difficulty in the distribution of the textbooks. This was mainly due to the inefficient transportation network existing in the respective countries, and the geographical barriers.

12) Absence of competition among the publishers

Competition leads to creativity among publishers and this leads to the production of better-quality science books. Where there is no competition there is no tendency towards improvement. Therefore facilities should be made available by the state to encourage the private publishers.

Solutions for the Problems and Needs Identified

The following are the solutions to the three most important problems and needs identified by Group B:

Problem 1:

Lack of professionalism among the writers, editors, illustrators and printers

Solutions

1. Regular in-service training programmes should be organized for those personnel in service who directly involved in writing, editing, illustrating and printing.

2. Decentralization of the training programmes

3. Organize professional experts from developed countries (in book production) to conduct workshops in member nations. With the help of such training programmes, training could be provided to a larger number of personnel with limited funds.

4. Identifying capable writers among the teachers by means of an appropriate selective mechanism (e.g. assessment test, interviews, evaluating specimen work, etc.) and training them under expert guidance.

5. Organize training programmes and workshops for those writers who are not experienced in regular science and for those who intend to take up writing as a career.

6. Regular overseas training programmes should be made available for the writers, editors, illustrators and publishers in order to enhance their knowledge in the respective fields. By such exposure they can share the experiences of other countries and update their knowledge and skills in science book production. In addition this could be an incentive for

those who are involved in book production.

7. Writers and editors who are not directly involved in teaching should be regularly and continuously exposed to the teaching-learning process in schools. They should also be exposed to the daily life of people (through discussions at parent-teacher meetings etc.) This process could be employed as a means of field-testing the text both prior to and after writing.

8. Those who are involved in producing science text books should be provided with incentives which could be in the form of financial rewards, fellowships, scholarships or technical assistance. This scheme should also be extended to the private publishers.

9. The science component in the teacher training programmes should be strengthened. Skills of writing and illustrating science texts should be emphasized.

10. Attempts should be made to develop science culture among the younger generation media. This could in the long run provide better-skilled producers of science books.

Problem 2:

Limitations in the availability of appropriate reference material for teachers/writers/editors/illustrators/students

Solutions

1. Familiarize such personnel with local and public libraries.
2. Request ACCU to document a list of reference materials appropriate for the production of children's science books in the respective countries.
3. ACCU is kindly requested to provide a mobile library of selected reference materials to help the member countries.
4. Contact international organizations such as the British Council, the American Library of Congress, Asia Foundation etc. and request assistance in supplying reference materials on science.
5. Selective components from science books produced by different countries could be compiled, documented and distributed among the member countries by the ACCU.

Problem 3:

Lack of professional cooperation among the teachers, writers, editors, illustrators and publishers

Solutions

1. Establishment of clear guidelines through proper communication will lead to a better understanding among the personnel involved in producing science textbooks.
2. Cooperation among the teachers, parents, students, curriculum developers, writers and editors should be established through the principals of schools (by organizing parent-teacher discussions etc.). This would enable the writers and the editorial staff involved in textbook writing to understand the needs of the students and also get feedback on the written textbooks.

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(3) Group-C Report

Problems and Needs of Science Books for Children

MEMBERS OF GROUP C

Dr. H.C. Jain (India)
Dr. Lourdes R. Carale (Philippines)
Dr. Tin Tun Oo (Myanmar)
Mr. Arshad Rawian (Malaysia)
Ms. Lee Soon-duck (Rep. of Korea)
Mr. Jamil Ahmad (Pakistan)
Mr. Shigeru Aoyagi (ACCU)

PROBLEMS AND NEEDS

The following problems and needs concerning the preparation of good science books for children were identified by the group through the N-P method.

1. There is lack of experience among

personnel such as professional writers, editors, illustrators, photographers, cartoonists and publishers.

2 There is a need for good quality and affordable books.

3. Exemplary material illustrating the development of process of learning based on activities is insufficient.

4 Reading habits amongst children for science books is very low.

5 There is a need to train the teachers in the key operations of science so that they can perform the activities given in the science books and generate other activities on their own.

6 There is a dearth of science supplementary books written in a popular style.

7. References from other countries are scarce.

8 Local relevancy in science books is still insufficient.

9 There is a need to write books in simple and understandable local language pertaining to different regions in any country to increase comprehensibility.

10. Translation of science terminology into local language is difficult.

11. Proper co-ordination is needed amongst various personnel involved in science book production.

12. More material incentives are required for science book production.

13. Exposure to international standard is needed.

14. Library services are insufficient.

15. Translation of good science books from other countries into local languages is a difficult task.

16. Greater variety is needed among the books.

17. Wide publicity and distribution of science books is needed.

18. Present examination system is too content-oriented.

Solutions to the Problems and Needs

A review of the problems and needs was done to combine a few problems into one with the view that some of the problems may have a few steps in common as regards the solutions. Four top priority areas were taken up. Discussion led to the following four major aspects:

1. Personnel

There is a lack of expertise and proper coordination among the personnel concerned in science book production. Proposed solutions were:

- Workshops, seminars, training courses and conferences should be organised at national, regional and international levels for personnel involved in science book production including authors, educational psychologists and other members of the writing team as well as editors, artists, publishers and production staff.

- Strategies for cooperation and co-ordination among these personnel should be developed.
- Reference materials on science book development and production should be provided by various specialist agencies concerned with the development of high quality books.

2. Quality of Books

There is a need for good quality and affordable books written in popular style using real-life situations. Proposed solutions included were as follows:

- To make science books attractive, these should include many coloured illustrations, activities, cartoons, stories and folk tales and other varied presentations in interesting formats on good quality paper.

- Government should subsidise science book production e.g. by giving tax exemption on paper, ink, etc. to promote good quality and affordable books.

- More incentives in the form of cash, awards, and prizes should be given to encourage development and production of

good quality books.

- Simple and familiar language should be used.
- Translation of good science books must be carried out into local languages.
- Exemplary materials by various specialist agencies should be prepared, circulated and given a wide publicity.
- Pre-testing of the books prepared should be carried out.
- Cost of books can be reduced by having a few advertisements.

3. Learning Processes, Evaluation and Teacher Training

Science books focusing on processes of learning and corresponding training of teachers in processes and evaluation are insufficient. Problem can be overcome as follows:

- Methodology emphasising activities should be adopted and teachers should be trained in the same.
- Books should stress the development of learning amongst children and not only the content.
- Evaluation and examination of students should be done in line with books including learning processes.
- Guidance to teachers on use of books should be mentioned.
- Training programmes for teachers may be funded by publishers.

4. Reading habit

Variety of science books in library to promote reading habits is lacking. To achieve the same, following suggestions were proposed:

- Library should contain a variety of good quality science books and promote activities, programmes and funding from various agencies.
- Mass media should be used for wide publicity and promotion of good science books.
- Awareness of good science books must be created among parents and community.
- Reading class in school and competition on varied topics among students should be organised and due incentive must be given for the same to sustain children's interest in reading science books.
- Country should strive for better socio-economic status.

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(4) Group-D Report

Problems and Needs of Science Books Identified

MEMBERS OF THE GROUP D

Mr. Zhao Zhan Liang (China)
Mr. Hossein Daneshfar (Iran)
Mr. Boun Xou Matmanisone (Laos)
Ms. Shubha Lakshmi Pant (Nepal)
Mr. Bae Yong-pha (Rep. of Korea)
Ms. Wanpen Suthagard (Thailand)
Ms. Taeko Kuroka (ACCU)

The ACCU representative gave brief orientation, then the group members mentioned the most important problems they face in producing science books in their own countries. Those problems are summarized and categorized in the following items:

1. Shortage of competent writers

A good writer is one who knows the subject matter and education as well, is open-minded, has new and interesting ideas for children, and 'loves' them.

2. Lack of trained editors

The editor must know many things, the most important are:

- The proper language for the target group, for whom the book is written;
- The proper method for presenting ideas and concepts;
- The needs of children;
- Coordinating the writer, designer,

illustrator, ... activities.

3. Terminology problems

Concepts of science do not differ all over the world. Most scientific terms and names have Latin origin, so, they are not familiar to students at lower levels, especially in countries not using the Roman alphabet for their writing. Names of chemicals, rocks and minerals, and some unfamiliar plants and animals are examples.

4. Poor manuscript

Some writers deliver their manuscripts in a very bad and tentative form, not readable, with many pictures missing, and the graphs or tables must be found or prepared by others.

5. Irrelevant content

The content written for children, sometimes is:

- Long and boring;
- Full of technical and scientific terms;
- With long sentences and difficult expressions;
- With wrong or old-fashioned concepts;
- Full of examples not familiar to children;
- Very serious.

6. Unskilled illustrators

Illustrators always have a very important role in presenting ideas. A good illustrator must have some background in the subject matter he is working on, but some of them have not! The world of children must be full of joy, so the illustrator must fulfill that role.

7. Poor printing facilities

This item seemed to be very important in most of the countries. Most countries do not produce enough paper and have to import it. The cost of paper is going up in the international market, and it needs lots of foreign currency. Also, in some countries the printing machines are old-fashioned and inefficient.

8. Untrained teachers

Teachers have leading roles in science education. They must be well prepared for their jobs, and familiar with the objectives of the programme and the methods presented by the textbook writer. But most of them are not, so, a good book will not seem 'good' to them!

9. Insufficient teaching aids

Teaching aids are necessary in science education, but they are not always available, so the science book writer has to omit most of the experiments and activities from the book, and such books mostly resemble 'history of science' books.

10. Inadequate facilities for teachers

Attracting teachers to remote areas in the country is not always easy, and they need to be paid more money or have good incentives for going to such places.

11. Large number of students

If there are too many students in the classroom, then the teacher cannot satisfy their needs, and she has to resort to the "Chalk and talk" method only.

12. Poor marketing

If the books published are not interesting enough, they will remain unsold. Also, in most countries the supplementary books are expensive and many families cannot afford to buy them.

13. Parents ignorance

Those who choose books for children are the parents. If the percentage of illiteracy is high among them, they will not be able to feel the need for supplementary books, and will only be concerned about their children's school work.

Solutions to the Problems and Needs Identified

PROBLEM: **Lack of Good Writers**

Group members decided to discuss textbooks only, because textbooks are more important for their countries than supplementary books. Also, all members agreed that in the process of textbook production, the urgent problem is how to find a competent writer (or group of writers) because, he is one who initiates the work and the others (editor, illustrator, etc.) should follow his ideas. Finding the personnel

to help the writer is not so difficult as finding the writer himself.

The job of writing requires creativity and many mental capabilities, too. Such people are rare.

It is always better to have more than one writer for a textbook. The team of writers must consist of:

(1) The subject specialist, preferably a university professor, because of his good knowledge about the subject.

(2) The teacher who knows the needs, the language and the background of the students in science.

(3) The educational technologist who knows the methods proper for representing ideas.

We agreed that the subject specialist must have some background in educational psychology to be able to produce a good book.

Because of the creative nature of the job, textbook writers must be selected according to their experience, their talents and their willingness to work for the children.

The writer, whether a university professor or a specialist, is often unused to being edited. Many leave after participating in the first sessions of training programmes, only some will stay, and some with delicate feelings have to be handled with care!

In order to ease the writers' path, our suggestions are given below:

1. Training courses

Different types of course training are necessary for writers in subjects like language teaching methods, usage of references and editorial techniques.

As the writers are usually busy and always short of time, the training courses must be useful enough to make them stay.

Preparing special pamphlets and some sort of handbooks for writers is mostly appreciated by them, and makes the job of training easier.

2. References

Writers need many sorts of references like libraries, picture archives, laboratories, science museums, different institutions, etc. Access to these places and things will help to save time.

Textbook and programmes of other countries are always a great help to writers, because the needs of children, and the objectives of science teaching are much the same in different places. So, these books help to share ideas and bring something out of them.

3. Process of book production

Writers must be acquainted with the process of book production and the role of each person in the process. Being so, a writer will know up to what stage he can still make revisions, what are the limitations and possibilities. This sort of knowledge enables the writer to use the references more properly and effectively.

4. Finance

Writers must be supported by the government, well paid and in a comfortable mental state. Anxieties affect the job of writing. The writer must feel himself free to be able to think about what he is doing. If the money paid to the writer is not enough, he has to have other occupations too. So, he will ask for more time to finish the job, otherwise, he will do it hastily and the result is not usually satisfactory.

Problems Identification & Analysis by New Participation Method

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III : PRESENT SITUATION OF SCIENCE BOOKS FOR CHILDREN AND ACTION PLANS TO DEVELOP SCIENCE BOOK PUBLISHING
– (Individual Reports of Participants)

There are PART-I and PART-II in the reports:

PART-I is on the present situation and problems of science books for children in the country concerned, and

PART-II explains the participants' action plan for developing science book publishing which was written at the end of the training course.

Bangladesh

by Mr. Chittaranjan Saha
Managing Director
Muktadhara

Part-I

Bangladesh is a country of twelve hundred million people. Area is 54 thousand sqr. miles. Literacy is 20% only.

The role of the government in the field of publication is limited. They publish textbooks up to secondary level through printers and publishers. In the field of production of literary books, science books and reference books, the role of the government is not much. Mainly private publishers publish all sorts of books.

Modern machines suitable for modern publications and printing are being imported in the country during the last decade. But due to dearth of technical hands they are not well operated. The quality of paper produced in our country is not also up to the standard to print in multi-coloured and sophisticated machines.

Socio-economic position of the country is not good. So individual purchasing capacity is very low. Number of the public library is not good.

Experience of this course would help me much to re-orient the policy of our publication company. We shall take help from the editors and the artists who are conversant with editing, production and printing of primary and secondary science books.

I shall try our best to materialize my experiences to the best and make our culture science oriented.

Part-II

The planning and the method followed in the training course are very much effective and deep rooted. It impressed me much and I learned a lot. After my return to my country I have the following new and practical plans of action for development of science books publishing:

1) I shall convene a meeting of our Board of Editors at Muktadhara publishing house and place before them my experiences in the training course.

2) I shall convince the Board of Editors as well as the Board of Directors that our present book production policy should be changed and it should be science oriented.

3) We shall survey the present market of science books.

4) We shall go through the possibility of new science books.

5) We shall contact writers, editors, illustrators, designers, photographers and do the needful to make our society science oriented.

Bhutan

by Ms. Maina Kumari Kharga
Science Curriculum Officer,
Department of Education

Part-I

Introduction

Bhutan is situated along the southern slopes of the great Himalayan range. It lies between China (Tibet) to the north and India to the south. Until 1920, the education in Bhutan was purely monastic. Each monastry had its own trainings for the young monks who were taught the classical Dzongkha and the religion.

In the 1920's, the First King Gongsa Ugyen Wangchuk established a court school adapted tod the needs and conditions of that period. It was suring the time of the Tdhird King (1952-1972) in the late fifties that a proper education system in Bhutan was established. The period was marked by the gradual opening of the country to the outside world and by socio-economic development. The First Five Year Plan was launched in 1961 and Bhutan is now in the middle of the Sixth Five-Year Plan (1987-1992). Throughout all these plans, priority has been given to improving education in the country. Bhutan now operates 195 schools (152 at the primary

level) and has 3,141 teachers serving the needs of 67,852 students.

Education System

With the process of modernization taking face, Bhutan introduced the so-called modern education only sometime back in late 1950's. As we had no curriculum of our own, we had to adopt the Indian curriculum to begin with. Within the last 25 years or so, Bhutan has made tremendous progress in developing its own education system. One of the objectives of the 6th Five-Year Plan is to nationalise the curriculum and make it more relevant to our national needs and aspirations. So accordingly, the Royal Government of Bhutan has given priority in establishing various sectors under the Department of Education to achieve this goal. One of the main developments is the establishment of the Curriculum and Textbook Development Division (CTDD) under the Department of Education. The CTDD has been entrusted with the responsibilities of nationalising the curriculum by writing appropriate textbooks of all subjects that are relevant to the Bhutanese children's needs.

In relation to the objective of nationalising the curriculum, a New Approach to Primary Education (NAPE) project has been designed and implemented on an experimental basis to 36 selected primary schools. In a few years time, it is hoped that this project will be implemented in all the primary schools in the country. The NAPE is an integrated approach which incorporates subjects such as Environmental Studies, Mathematics, English, Social Studies and the National Language, Dzongkha. Simultaneously, a lot of work is underway in developing the science curriculum from Class 4 to Class 10.

Despite of the fact that the science curriculum is in good progress, a lot of constraints are being met in the development of curriculum. Some of these are:

- The shortage of qualified and skilled manpower in the Curriculum and Textbook Development Division
- Lack of reference materials
- Lack of appropriate equipment in schools to carry out activities as suggested
- Lack of artist and graphic-designer

1) The shortage of qualified and skilled manpower:

The Curriculum and Textbook Development Division (CTDD) being newly established have very few curriculum specialists who are in a position to write the curriculum. However, the priority has been given by the Royal Government of Bhutan for training and specializing as many Bhutanese candidates as possible to meet these shortcomings in the few years ahead. At the moment, the government has explored possibilities of recruiting foreign and international expertise to be a helping hand in the area of the curriculum development.

2) Lack of reference materials:

Due to very limited reference books available, the curriculum writers face acute difficulties in looking for emerging ideas and concepts. The CTDD at the moment do not have regular supply of any kind of journals and periodicals produced nationally and internationally.

3) Lack of appropriate equipment:

Shortage of appropriate equipment in schools is one factor which does not meet the expected approach of teaching/learning which is indicated in the textbooks. Since the science equipments are mostly manufactured outside the country, the supply of the materials demands huge financial investments which itself is a heavy responsibility to the Department of Education at this stage.

4) Lack of graphic designer and artist:

As there is no graphic designer in the curriculum division, the problem of laying out and designing the book always is an extra burden on the curriculum writers. Absence of an artist is another problem for the curriculum writers as they have to either do the drawings themselves or to look for an artist as and when needed.

The problem of designing and laying out of the book is thought to be very severe as it leaves an effect on the look of the book produced. The curriculum writer also is being burderned by having to do the editing himself/herself as there is no specified editor in the Curriculum Division.

Part-II

Science is a very important subject which prepares the children to live in a fast-changing technological world. Good science books are very important in order to improve the quality of science education in Bhutan.

The Department of Education has recognized the importance of good science education in the country and is already engaged in the production of science books in the country. As mentioned in the proposed solutions during the training course, it is felt that in order to produce good science books it is important to have specialised illustrators, designers, editors and writers. Resource materials and reference books are equally important for the people involved to refer to the up-to-date trend in the production of science books. As such facilities are very limited in Bhutan, a proposal for the same would be put up to the National Commission for Unesco through the Education Directorate. It is also hoped that the international agencies like Unicef and Unesco will be instrumental in supplying the reference books and other necessary resource materials.

Science books for children are to be produced with good coloured illustrations. Despite the fact that coloured illustrations are expensive to be printed, it is however felt that a source of funding has to be explored for the good printing of books.

In Bhutan, as we are already on the process of writing and implementing the activity-oriented approach of teaching/learning, importance now has to be given to the supply of sufficient equipment and teaching aids to schools to make the teaching/learning more effective. Along with the production of science books, teachers have to be trained to teach with the activity approach.

Being a developing country, it will be very difficult to give refreshment courses to people involved in the writing of science books and to send them out for study tours. However as this is thought to be very important, a proposal would be put up to the Education Directorate to make the above programme possible in order to improve the expertise of the curriculum writers. If organisations like Unesco could help in this matter, the same would be made possible.

A possibility of networking system of journals and periodicals will be explored in consultation with the National Commission for Unesco.

The materials produced under the Asian/Pacific Joint Production Programme of Materials for Neo-literates in Rural Areas (AJP) that were introduced to us were thought to be useful not only to the neo-literates but they could also be used as teaching aids in primary science classes. I would recommend to the Department of Education that such materials be produced in our own language and used in primary schools.

The idea of having a home library and science clubs are very fascinating. I would suggest to any people interested in having home library and science clubs and give them the ideas of starting them.

The NP method of discussion was very successful in the discussion of problems of producing science books in the countries represented and the solutions for the same. It was an effective method as it gave a chance to each member to express his/her views on paper which otherwise would not have been possible for some shy people. As this method is a good way of conducting group work. I would use the same when I am conducting workshop or seminar with the science teachers.

As the language level of the content in the science book is to be simple, I would make sure that the science textbooks for the primary level has simple easy reading materials supplemented by coloured illustrations that would interest the children. The science books are to always start with something very interesting that would arouse children's curiosity.

The simple science picture books that were shown during the lectures were very informative. If the pictures are illustrated in a clear manner with simple sentences, children will learn much better. As the facility of science picture books and magazines are lacking in Bhutan, I would put up a proposal to the ministry concerned if such picture books and magazines could be produced in the country.

by Zhao Zhan Liang
Editor/writer
Biology and Science Dept.
People's Education Press

Part-I

China is a country with a large population of 1160 million. The amount of her primary and secondary school students has nearly reached 200 million. So the development of primary science books plays a great role in raising the scientific quality and developing the productive forces of the whole nation. Since the target of modernizing the country has been put forward, greater stress has been attached to the publication of primary science books. Some of the old and specified publishing houses, such as People's Education Press, Popular Science Press and Children's Press have done a large amount of work in this field. In recent years, a lot of new publishing houses have been set up, and new magazines and newspapers on science for children published throughout the country. In addition, some research and academic organizations have been founded, such as the Curriculum and Teaching Materials Research Institute, the Popular Science Research Institute, the National Association of Primary Science Teaching, the National Association of Instructions of Children's Scientific Activities. All these organizations have been doing a lot of work in developing primary science books. Now I would like to talk about the present situation and developing trend of primary science books in China and the problems I have met in writing and editing such kind of books.

Present situation on primary science books in China

The primary science books published in China can be divided into two main types: textbooks and extracurricular reading materials.

1. Science textbooks in primary schools: Science course is offered from grades 1 to 6 in primary schools in China. Most of the primary science textbooks are written and published by People's Education Press. Since 1982, with the implementation of the reform and open policy of the Chinese Government, primary science textbooks have also been reformed in the guiding ideology, methods of compilation and other aspects. Instead of introducing the knowledge to children directly as before, the principles of the investigation and colloquium teaching method are applied in writing and compiling textbooks so that children can be guided to discover and solve problems by themselves, to understand the essential scientific conceptions and methods, to cultivate their scientific views, attitudes and ways, and to raise their interest and ability of learning and applying scientific knowledge through investigation and colloquium.

This set of textbooks is now used in the primary schools throughout our country and well received by both pupils and teachers.

2. Extracurricular reading materials: Extracurricular science books for primary schools published in China are plenty both in kinds and quantity. In terms of subjects, they include physics, chemistry, biology, astronomy, geology, aviation, environment, energy resources, etc. In terms of contents, some of them pay particular attention to basic knowledge, some introduce the achievements of modern science and technology, some tell the stories of scientists and others are about the history of science. In the past, primary science books in China mainly introduced scientific knowledge. Now there appear books which guide children's scientific activities, such as "Teen-agers' Scientific Activities on Meteorology", "Looking for Stars" etc. This kind of books and the science textbooks can be supplements to each other. But so far, the variety and number of these books are far from enough.

There are still some difficulties and deficiencies in producing primary science books in China. Firstly, the level of the writers need to be raised. Writing primary science books is a synthetical art which combines science with pedagogy, psychology and literature. The writers should have an overall accomplishment of science and culture. But at present, many writers still regard primary science books as a tool to introduce knowledge only. They have neither recognized explicitly nor taken it seriously that science is an exploring process and primary science books should guide children to discover and solve problems by themselves. Therefore their books fail to agree with the spirit of the classroom instruction on science in school.

Their books and the classroom instruction cannot supplement each other. Secondly, the printing conditions are not good enough in China. The quality of the primary science books is not satisfactory because good-quality paper and printing machines are limited.

Developing trend on publishing primary science books in China

From now on, primary science books published in China will pay more attention to the following aspects: introducing the new achievements on science and technology; developing children's intelligence instead of only introducing knowledge; tallying with the psychological characteristics and level of understanding of children. There will be more and more books in series and in colour.

The problems I have met in writing and compiling primary science books

Primary science books should introduce not only traditional basic knowledge but also advanced science and technology which are based on profound theoretical foundation. How to introduce this kind of knowledge in primary science books and make it understood by children is one of the problems I met. In order to write the books which can guide children in exploration just like scientists, the writers should have the experience in scientific research as well as in science teaching. Only having the experience in scientific research can the writers know well the procedure and method of scientific research directly and explicitly. And the teaching experiences are helpful to the writers to make the contents of primary science books fit children's psychological characteristics and level of understanding. I have devoted myself to writing and editing primary science books for seven years. But I haven't got enough experience in either scientific research or teaching. This is another problem I confronted with.

China is a developing country. The publication of primary science books is also developing. Only the vocational level of the writers and editors is raised can the quality of the primary science books be raised.

Part-II

Through the training course I've got many new ideas which are very helpful for me to produce science books in the future and have aroused some new plans in my mind mentioned below.

Textbooks:

My main work in China is writing and editing textbooks. Referring to the lectures given in the course, I will improve the textbooks written by myself in aspects on: 1) The Language: the Language should be as easy as possible, when we introduce a topic, the first question mentioned is very important for attracting the attention and arousing the interests of children. So I will improve the language and questionnaire of the textbooks after I return to my country. 2) Illustrations: illustrations play a great role in making the contents clear and interesting. However, pictures in children's books should be simple. We shouldn't expect that children get to much knowledge from one picture. I will improve the illustrations of the textbooks written by myself.

Supplementary readings:

I was deeply impressed by the examples of experimental and observational instruments shown by Mr. Yasushige Uchida pf a science magazine publisher. I'll show these examples to other editors concerned and suggest them to produce these kind of supplementary materials. I was also impressed by the telephone dial programme "Why and How Dial No. 110" which is used to connect the magazine editors with children. I will introduce this programme to my collegues.

Literacy materials:

The literacy materials published by ACCU in the previous years gave me a strong impression. China is a country with big population. In rural areas, many people are still illiterate even though the government has been making great effort. Therefore, publishing books for illiterates is a significant project in China. I will dedicate to produce some books or other materials for illiterates, especially about environment, animals, and plants in rural areas. For instance, some peasants often beat snakes to death because they think all snakes are harmful. If they know snakes benefit mankind to some extent because snakes eat mouse, their idea and behavior will be more perfect.

Articles:

Bunko and science club also gave strong and exciting impression. I think that they are very helpful for cultivating children's reading habit, interest and ability on science approach. Pupil's activities which I have seen in science club and a primary school class in Japan don't need valuable instruments. So I will write some articles to introduce what I have seen in Bunko, science club and primary schools in order to have more and more Chinese children can enjoy these kind of activities.

How to develop children's science books in Asia and Pacific? ACCU has been doing their best. I will do my best in the future.

India

by Dr. H. C. Jain
Reader in Physics
Regional College of Education

Part-I

Hopes: In our country science text books at primary level are mostly in the form of environmental studies or environmental science. Thus it is expected that the science content presented in these books must be environment based with examples from real life situations or the contrived ones. In other words, emphasis has to be on activity based learning with suitable examples pertaining to environment. Environment in context is very varied as the local conditions, may be physical, social or psychological, are very different as we move from one region to another.

Second aspect we have emphasized is that the activities must match with the age group of the learners. Observation has therefore to be the key component at a very lower level and may extend to the processes of classification taking into consideration initially one variable and then more. Later on other processes of learning may be taken up into consideration while developing the content.

Thirdly it is hoped that there are profuse illustrations.

Other aspects we emphasize are lucidity of the language, enough self check questions and some suggested activities which can keep the learner engaged to develop on his own.

Realities: Difficulties regarding science text books start right from the time, we decide to produce. There are not enough scientists who are ready or eager to write these books at primary level. This is due to two reasons. Firstly, a few of them either don't get time or their work is more interesting to them. Secondly, a sort of psychological taboo works that it is degrading to work for lower classes. The net result is that popularisation of science so that translations of higher level content to a lower level takes place is at times wanting. This difficulty has been partially overcome by the agencies like NCERT (National Council of Educational Research & Training) and SCERT (State Council of Educational Research & Training). A pool of writers is drawn from different spheres including teachers from primary level schools who actually teach primary school students, persons from teacher training institutions and from universities.

Once the manuscript is ready it is edited. It is seen many a times that the target groups are nowhere in sight before the writers. In other words, the characteristics of learners is not paid due attention. Therefore the task of the editor becomes to transform the prepared material into one which can suit the needs of the learners and is relevant to them as well. Even as editors, we face the problem of converting this material to a relevant one. The reason is our country is very different when we move from one region to another. We always have a difficulty to have the material with examples from local life situations as they are varied ones. As a result, if more number of examples are taken, text becomes bulky. There is therefore a feeling amongst the parents, that the children of today in our country have to carry more load on their shoulders than what they can correspondingly build up in their minds. As editors, we therefore have the difficulty of producing less bulky material with up to date content incorporating such examples which can serve the propose of students coming from different regions of the country.

We emphasize activity based learning in

our country. For this we have tried to supply a Primary School Science kit to as many schools as possible. Funds of the school are limited. Thus we face the difficulty of bringing out the text books in such a way that all the activities revolve only around the supplied Primary Science kit. This puts a check on the type of activities we can think of including in the text books. As a consequence, the text books become oriented for a particular content syllabi and not understanding oriented. Here of course, I am not denying the fact that pains taking teachers and gifted ones design some activities on their own. But the difficulty still persists.

There is another aspect of this activity based learning in our country. We as editors have to see whether the content is matching with the age group of learners. Mostly, it is seen that the writers are less equipped or not at all with the Psychology of Learning. As a result of which, they will write any type of activity, they think fit without bothering whether the same will be conceived by the learners or not. At times, it becomes very difficult to convince some writers that the activity they are thinking of is not at all suitable, though it may be correct from the point of view of content.

We also feel the difficulty of incorporating such activities which can sustain the interest of learner for further reading and also make them feel that they themselves are the explorers and not just the readers reading a language book.

Material pertaining to skill oriented teaching leading to the process such as exploring the environment, collecting and analyzing the data, interpreting the results pertaining to any event, phenomena is also not forthcoming. We have to tell the writers that conveying the facts is not as important as developing the skills in the learners at lower level. Attempts have of course made in this direction. However the difficulty of developing the process oriented material keeping in view of the local resources as well still persists.

Language is yet another problem. We have so many regional languages. As a result of which, it is very difficult to bring out science text books in so many regional languages. Translation at times into another language kills the very spirit of the material it is written. Lucidity of text from language point of view is limited by the fact that even as we editors, know only one or two languages.

It is difficult to include many illustrations as it increases the cost of the book. It is also difficult to include the coloured pictures from the point of view of the cost. Publishers are not ready to take up books for publishing if it includes many illustrations or the coloured pictures. It is in fact not that they are not willing but the constraint of higher cost of the books works in their minds.

Conclusively, I would like to say that though we are trying to develop text books keeping in view the needs of learners, the need of present day content and its relevance and with all what the psychologists and educationists say but still there is a lot of scope for improving our text books.

Part-II

After going back from Japan, as a teacher educator, writer and editor, I will propose to my authorities to carry out the following activities on my own and as a group member of my organisation:

- Organise workshops and seminars at state and regional level consisting of personnels viz., administrators, educationists, writers, editors, illustrators, publishers and others and acquaint them with the problems, needs and the type of materials being brought out in different countries of Asian & the Pacific region, and exposing them with the trends in Japan in relation to production of science textbooks, magazines and other supplementary materials.

- Train the participants of these workshops as well as teacher trainees of my institution in N-P method.

- Request the teacher training institutions through my authorities to incorporate in their syllabi the preparation of a picture book at primary level and train the teacher trainee in the same.

- Prepare materials for neo-literates as has already being done in our programmes such as non formal education, CAPE (Comprehensive Access to Primary Education).

- Continue to write on my own and edit popular science books and request the appropriate agencies and Ministry of Education to subsidise the production of science books so that more quality books with coloured illustrations but cheap as well may be brought out.

- Keep in contact with agencies at local, national and regional levels working for the cause of promoting science books at primary level.

Lastly, I would like to make a few suggestions as follows:

- Some discussion on psychology of learning as it is the basic key for the development of behaviour particulary at lower levels.
- Some discussion on how we can provide a link to upper primary class through our books.

- A two day programme where illustrator, writer, editor could sit together and develop an exemplary material for use at primary level.

Indonesia

by Mr. Saiful Muzani
Editor
Mizan Publisher

Part-I

Although figures do not exist, it is reasonable to assume that at least 65% of all publishing activity through Indonesia relates to textbooks for primary and secondary schools. It is estimated that between 3000 and 4000 titles are published each year. Of these some 2000 are brand new titles, the remaining are reprints or new editions. The average print run is between 3000 and 5000 copies and this is considered to be about two years' stock. These figures relate to non-textbook publishing. On the basis of these figures the total number of non-textbooks sold each year is somewhere between 4,500,000 and 10,000,000. This is certainly a substantial underestimate, however there are no reliable statistics so it is necessary to resort to intelligent guesswork.

In 1987/1988 there were 26.6 million children in primary school and 10.2 million in lower and higher secondary schools. If the former buy an average of 5, this would mean that between them they buy a little over 100 million books. If this represents 75% of all books sold, the remaining 25% would amount to some 35 million. Even if the number of textbooks is halved and with the number of non-textbooks the total of the latter would still be almost 17.5 million. If textbooks only represent 65% of the total the number, non-textbooks would rise to 28 million.

The lesson to be drawn from these figures - however inaccurate - is that Indonesians buy very few books. Publishers ask again and again why Indonesians do not buy books.

I think the real answer must be that Indonesians do not buy books because Indonesian do not read books. The real question is therefore 'Why do Indonesians not read books?'

It would seem that once most Indonesian pupils leave school they rarely pick up a book again. Can it be that Indonesian teaching method and textbooks actually are partially responsible for this phenomenon? It does seem that they are. The textbook is an essential part of the rote method of learning. Education is all about passing examinations and the textbook is the tool that enables pupils to pass examinations. Once the examinations are passed (or definitively failed) the textbook is of no more use.

Books, particularly science books, seem unattractive to Indonesian pupils. If we try to find why they are not interested in science books, we will find that it is not a simple question. Its root can be explained from macro and micro perspectives.

Indonesian pupils generally come from families where literate culture is not yet familiar to them. The pupils are socially not controlled, their parents are busy with their own problems of how they can feed their children. The pupils are not either accustomed to going to the library. Their environment is not very conducive to internalize the fact that reading is a part of their essential need.

Besides, if we focus on objective condition

of primary science books per se , it will be found that the objective condition of the books also influences why the pupils are not very interested to read. In general, many primary science books were written with such a highly abstract explanation that pupils cannot understand it easily without further explanation from their teachers or families.

It is found that many primary science books use such technical terms which are strange to the daily life of the pupils that they get difficulty to understand the books.

Many technical terms in primary science cannot be accurately translated into Indonesian language. Such as 'community', 'society', 'energy', 'psychic', 'physical', etc. All such terms are strange to pupils, and need teacher and the like to explain. This indirectly makes the pupils very dependent, and finally easy to get bored to read such books.

Many primary science books are not very attractive, because of their cover design, layout, setting, and lack of illustrations, pictures, etc., whereas they determine the quality of primary science books in the eyes of pupils.

Many primary science books were published with hundreds of pages. This is not very efficient to pupils. They generally prefer thin books with color pictures to the thick ones.

Not all authors give their manuscripts with appropriate style of writing as primary science books. In terms of primary science books, they should be edited. But appropriate editors is very limited and rare. There are not many who are interested in editing profession for primary science books. Because that profession is economically not profitable, and socially not prestigious.

Part-II

Japan is Japan, Indonesia is Indonesia. These two countries have different socio-cultural background. Yet, beyond the differences, I see a common platform, that is the need of more cooperation among those who are involved in the existence of book production (parents, children, teachers, scientists, editors, illustrators, photographers, educators, intellectuals, etc.). How to organize them for the sake of book production for children can be approached with N-P method which I experienced in this training course.

N-P method has been known in my country, especially in the field of social science research. I know this method theoretically and principally, and am trying to implement and apply it in wider field. But I'm very poor of experiencing this method, especially in connection with children book production. Therefore, I should enrich myself with experience how this method is applied in the field of book production for children in my country.

Theoretically, and practically have been proved by many activist of popular education, N-P method helps people to be self-reliant. If this N-P method is applied seriously in book production, it will give a revolution for popular culture, besides it will help people to minimize upper class domination and exploitation of lower class of society. This method will help people able to produce books in accordance with their own need assessment.

When I come back home, I want to intensify my dialogue with my people in accordance with my capacity as editor and lecturer. The first step is how to strengthen and empower our managerial ability for popular dialog as basic element for social transformation. The second is to learn with people what and how our real problems and needs; the third is to transfer our problems, needs and the solutions into literal forms, such as books, journals, etc., including problems and needs of children culture (such as condition of children science books). For this purpose people and I should produce books or journals based on our problems and needs as a part of exploited class of society.

In my country, there are some intellectuals, scientists, artists, and social activists who are interested in popular education. Training course on book production for children can be organized inviting the personnel above as facilitators. And I'll try to persuade my publisher to support this plan. I'll understand if my publisher does not support this training, because it is financially not profitable. But I am sure, without any support of established publisher, such training course can be carried out, and the ideas of popular books for children can be implemented. Because this training course on book production

for children basically and principly relies on capability of people themselves.

Before we go to the people for the training, it is important to carry out "pre-training", that is a "training for trainners". This training will help facilitators for the training course on popular books production for children. We have enough human resource. It is the work of "popular management" to mobilize this human resource. This is the problem of cooperation and organization. We should improve our skill and enrich our experience in the cooperation and organization to cultivate the human resource effectively. My students at university where I teach, can be a part of important human resource for this planning. Many of them are idealist, hard-workers, and radical. It is my work to come to them to discuss this planning.

As far as I know, there are some Non-Government Organization (NGO's) in my country which concentrate on popular education. But I see this NGO's in crisis now, because their activity should be faced with strong status quo. I am trying to solve this crisis, to carry the NGO's out of the crisis by increasing and intensifying consolidation, and trying to establish more NGO's focused on especially popular education, including on book production for children.

Iran

by Mr. Hossein Daneshfar
Editor, Curriculum Development Center (Science Section), Organization of Research & Educational Planning

Ms. Tahereh Rastegar
Science expert, Organization of Research & Educational Planning

Part-I

Science books are not published for children very often in Iran, but great interest is being shown in the few books obtainable. The main cause is the fact that there are very few good authors who can write science books for children, or in other words, they are not properly trained. They mostly know the basic rules of science, but are not familiar with concepts of education. They don't know children's needs, language and interests. These authors mostly prefer to work for adults. The reasons for their lack of interest in children's affairs are related to several factors the most important of which are discussed below:

1. Textbooks

The problem of centralized system:

The system of education in Iran is centralized, so, following the decisions made in the Curriculum Development Center, uniform textbooks are recommended for students of each grade all over the country.

One result of such a policy is the lack of competition among authors and limitation of the variety of textbooks. Of course, the Curriculum Center tries to employ the most qualified persons for writing textbooks, but it is not always an easy job. The science teachers in remote cities have not easy access to the center and the necessary references, so, they do not have the opportunity to cooperate in writing textbooks, and the task remains to be carried out by a limited number of authors. Revision of textbooks takes place rarely and the format of books seldom changes considerably.

In 1980, the science department of Curriculum Development Center decided to review the science syllabi and rewrite textbooks for the elementary level, but the problems related to the Gulf war, were a great barrier for starting it.

The preliminary studies are going on these days and the work will actually be started next year.

The problem of teachers:

Because of the great increase in the rate of population growth, the number of students and classes is rapidly growing, and teacher training centers are not able to meet the need for new teachers. This situation obliges the decision makers to show little strictness in selecting students entering teacher training centers and consider shorter periods of training programs. So, they are not well prepared for their jobs, and are not quite familiar with new teaching - learning strategies. These teachers are not mostly able to enact the goals of the program, set by the authors of the books and Curriculum Development Center. Obviously, having such unqualified teachers will bring the job of revising and renewing the books to a halt, because it takes a long time for the

teachers to get acquainted with the concepts in the books they teach.

Publishing teacher guides and holding inservice-training courses cannot go together with the growth rate of students and teachers. Moreover, the teacher guides usually do not "guide" teachers properly as desired and problems remain unsolved. Such teachers usually choose the method of "chalk and talk" for their classes because of the great number of students in the class, and don't want their students anything but to memorize the facts and figures written in the textbooks. So, there will be no opportunity for the students to improve their various learning capabilities.

Moreover, the centralized system makes instructors teach all the concepts in the textbook, because the students have to pass some sort of final examination, and it is not their own teacher who prepares the tests and questions.

Using such strategies in teaching affects the approach of authors and curriculum developers. They cannot present the new methods of teaching in their books, because they know that their efforts will be neutralized by inefficient teachers. Besides, it will make teachers uncertain about what they are teaching.

2. Supplementary books

In order to diminish the above mentioned problems, The Ministry of Education has decided to publish supplementary books in many fields of science, reference books for teachers, and also, magazines for different age groups of students. Because of low prices, the books are sold very quickly and considering that this sort of activity has started only a few years ago, most of the books need reprinting.

As the scientific concepts are the same all over the world, and only the methods of representing them are different, the center has decided to translate good science books which are more or less famous in western societies in pre-university levels.

There are also seasonal magazines for science teachers in the fields of Physics, Chemistry, Biology and Earth sciences. The aims of these magazines is to improve the scientific knowledge of the teachers and make them familiar with the newest methods of science education. In other words, they are some sort of teacher guides in general.

3. Other books

There are semi-governmental, a free institute (Children Book Council) and several free publishers who publish science books, but their problems are far more than those of governmental institutes because:

1) The price of materials needed (paper, film....) is high, so, the price of the books published will be high, and it is not possible for many families to buy them.

2) Children are prepared for far future, and their world is small, but entering this world and touching their needs is not easy. Working for children has no immediate profit, so the people capable of writing science books, prefer to work for university students. In recent years, many more students are entering the universities, so they need more teaching facilities and more new books. The authors choose this simple job which is more profitable and makes them more famous.

Another reason why science books for university level are needed more, is that the choosers of these books are the adult students, but the children's books must be chosen by the parents, and sometimes they do not feel the need, especially if the family belongs to a culture different from those introduced in the books.

Part-II

by Mr. Hossein Daneshfar

In the latest report, we mentioned that lack of manpower (specially writers), is the main problem for most of us, either because good writers are not willing to work for children, or they don't know how! (In fact, I was one of them who preferred to work on secondary school biology mainly, but this course changed my mind to a large extent. I think I would certainly join the group which works for primary level when I go back home). Another good result of this course was that we will certainly arrange some training courses for the writers. I was always wondering what sort of subjects must be offered to these people who are mostly university professors, and how the training course must be held. We practiced it once before, but most of them showed little interest, perhaps because they were not

involved in learning as ACCU did here to us. We were always busy here. Even I prefer to call it a "Do It Yourself" course. The course increased our self confidence and I think we can follow ACCU's way of doing in our country too.

The people we met from other countries were very good references. I always had the chance to share ideas with most of them if not all. These talks were of great help because we always wanted to know what others do in similar situations.

After all, there are always limitations for us. Education is not something apart from other aspects of life. Teachers belong to the society, they have a very important role in educating our children. So, they must be well chosen, well trained and well paid. Those are expectations and aspirations that do not happen to be true. It needs money and many facilities which all countries do not possess. Providing good books and other teaching facilities also need fund. Only educated people ask for better living conditions, and these people usually know how to earn money. So, we encounter a vicious circle having money means having access to good education, and good education develops bright brains, and people who are eager to work hard see far ahead and be dedicated. Education and brains are not things that can be imported from other countries, but good ideas and experiences can. In this respect, we must be thankful to organizations like ACCU that provide opportunities for gaining good ideas and experiences.

To summarize my debate, going back to Iran, I will:

1) Arrange training courses for personnel involved in textbook preparation.

2) Prepare some sort of "Guidelines" as a directory for those writers who cannot attend training courses.

3) Convince writers to work for children.

4) Arrange summer courses for school children about science activities.

Part-II

by Ms. Tahereh Rastegar

In fact the 23rd training course on book production in Asia and the Pacific (Training Course on Producing Primary Science Books) was one of those training courses that Iranian participants were looking for, because Curriculum Developing Center of Iran has decided to revise the science textbooks of elementary and junior levels, therefore it is very important that we get advice from science experts of developed countries such as Japan, America and European countries. Since this course was focused on producing the primary level science books for children it gave me an opportunity to share and exchange the experience of experts in different fields and also of different countries.

As it was mentioned in previous report, the most serious problems that are faced by Iran in producing and teaching science textbooks are as follows:

1) lack of professional writer, editor and illustrator in science book production

2) lack of qualified teachers in primary levels

3) lack of suitable activities in science class due to:

   a) limitation of science hour time
   b) lack of activities in science textbooks
   c) lack of suitable kits and laboratory facilities in primary schools.

4) Rapid increasing population which causes the higher number of students in each class every year. Producing a well qualified science books is not the solution for all mentioned problems, but can reduce the severity of them. However each of them has its own solutions which should be achieved simultaneously. Since I am a science expert in Research and Educational Planning Organization of Iran, the following suggestion will be submitted to the Curriculum Development Center:

   a) The syllabus of science textbooks should be activity oriented rather than content loaded.

   b) The proper activities should be chosen so that some of them might be done outside the school.

   c) Suitable and proper use of Kamishibai (picture story-telling) in teaching or parallel to science books in first grade of primary schools can attract the

interest of students much better than the ordinary science books.

d) Introducing scientific terms to the students must be done very carefully, i.e. after enough explanation and activities related to each scientific term they may be introduced in order to make the student get actively acquainted with concepts of scientific terms rather than memorizing it.

e) Science books producer must be exposed to overseas training courses to make use of the experience and advice of international and high qualified science experts and get aware of modern technology of science book production.

f) The N-P method (New Participation method) can be introduced to the students of teacher trainer centers and also make use of it in order that teachers get acquainted with that and make proper use of it when needed. NP method is also useful for any group work such as science book production.

g) Suitable reference material should be supplied with the help of some international organization such as Unicef and Unesco.

h) The best oversea's supplementary science books should be translated to Persian language, in another word attention should also be paid to translation rather than only local supplementary science book production.

i) Teacher's guide books should be written so that it both helps and encourages teachers to plan their lessons.

j) The importance of in-service training must not be forgotten.

k) Attention should also be paid to produce supplementary science activity books so that the students can learn science through discovery and also improve their science culture.

l) The workshops similar to the one which was delivered by Dr. Kako, can be used in teacher trainer colleges, to make the students get aware of their hidden abilities and also in-service training for teachers.

Laos

by Mr. Boun Xou Matmanisone
Vice-Chief, Division for Natural Science Curriculum and Textbook Development for General Education, Research Institute of Educational Science

Part-I

Lao P.D.R. is a small country with population of 4,053,000 inhabitants and its territory covering of 236,800 square kilometers. It's a landlock country with a small scale, scattered production and its economy is based on agriculture and forestry.

Education at all level is given in Lao (National language). In general education, the school system is divided into five-years primary school (ages 6-11), three-years lower secondary school (ages 12-14), three-years upper secondary school (ages 15-17). In primary school, science is taught as compulsory subject. From grade one to three, it's integrated into the reading, but from grade four to five, it's taught as an integrated science.

Since the establishment of Lao P.D.R. in 1975, the Ministry of Education has reformed educational curriculum development and simultaneously textbooks, especially science textbooks for elementary school.

1) The major obstacle we faced in writing primary science books in Lao P.D.R. is the shortage of experienced teacher educators, experts on curriculum, and textbooks development, science specialist, practicing teachers and psychologists.

- The lack of appropriate research to identify needs and to provide detailed analysis of expressed needs priorities and cost effectiveness, because such procedures can provide information on special requirement of advantaged children and disadvantaged children.

- The content of science textbooks does not engage children's interest and does not arouse their curiosity.

- Science textbooks do not suit the general levels of teachers (Low level of teaching

staff, inadequate knowledge of child development and educational psychology).

- From the point of view of economic development of the country, the content must satisfy the need to raise educational level and the way in which schools should reflect the educational policies of Lao P.D.R. government and the social values of communities.

- About the preparation, trial and evaluation, the quality of textbooks is a direct reflection of the quality of those who produce them. We are in lack of qualified, experienced and well trained authors, editors (reviewers, or evaluators) and illustrators and designers (art editors).

2) The second points of difficulties concern the publication, production and distribution.

- Shortage of fund available for the publication

- High cost of publication

- 95% of equipments and materials for the printing houses are imported from abroad.

- Science textbooks have not been available in sufficient quantity. Many schools are without science textbooks particularly in the remote areas (due to the difficulties in buying science textbooks).

But, step by step the Ministry of Education and Sports has made an attempt in order to overcome many difficulties by taking some actions as follows:

- Subsequent revision of the curricula and textbooks (especially science textbooks for primary school)

- Improvement of the distribution of revised curricula and science textbooks

- Special attention has been paid to the supervision and inspection of curriculum implementation and to the teaching and leaning process.

- Training the untrained teachers in primary school

From here to the year 2000 we have to execute some measures prescribed by the strategy on education of Lao P.D.R. government for the year 2000.

- Undertake the appropriate research about Lao pupils' psychology and achievement. Collect information and data in each region: economic data, base of production, particularities to take into account in elaborating new curriculum and in compiling science textbooks for primary school.

- Special attention should be paid to attract the concerned persons in involving in writing and editing science textbooks.

Part-II

I would like to describe my new and practical plan of action for development of science book publishing in my country as follows:

Our urgent need is to provide good quality science textbooks in sufficient quantity for the whole country. Our natural science division, one of the five divisions of R.I.E.S. is responsible for curriculum and materials development for Mathematics, Physics, Chemistry, Biology, Agriculture and domestic science and for the design of didactic materials and teaching aid. In the period of 1987-1988 we carried out the subsequent revision of science textbooks, especially for primary level.

Since 1988 we have been working out new curriculum of science at elementary level by introducing a new subject (from grade 1 to grade 5) which integrates science and social and moral education and reduces the number of subjects from 11 to 8, in line with the current trend. In this subject, "the world around us", pupils will be encouraged gradually to come to terms with current issues in the world they live in, how to take care of their bodies and their environment, and about their place and role in the community.

Since 1989 we are compiling science textbooks for primary school (for grade 1 to grade 5). Actually we come to term with prototype of science textbook and prototype of teacher guide for grade one for the trial in school year 1990-1991. We have to compile, try out, revise and rewrite science

textbooks for grade 2, 3, 4 and 5 respectively. This process requires the planning to meet needs for textbooks and reading materials, preparation, trial and evaluation followed by production and distribution. In consequence, not only the staff members of our natural science division may be involved in this process, but also, staff members of other divisions in our institute and other concerned persons should be involved in the compilation, trial, and evaluation of these science textbooks.

In order to fulfill this strategic task assigned by the Ministry of Education of Lao P.D.R. Government and according to the solution proposed by group D of this 23rd training course, the urgent need to overcome obstacles is to update continually the knowledge of teachers in primary school and of other concerned persons in writing science textbooks for primary school in my country.

Therefore I would like that national workshop on producing science books for primary school and for children should be held in Lao P.D.R. under the financial assistance of ACCU and the guidance of resource persons from ACCU. This will be a precious opportunity to encourage teachers and other concerned persons to involve themselves in writing and editing good quality science books for children.

Malaysia

by Ms. Azian bt. T.S. Abdullah
Assistant Director
Curriculum Development Centre,
Ministry of Education

Part-I

1. Introduction

In Malyasia, science as a single subject is not offered at the primary level. Instead, a subject called "Man and the Environment" was offered to Years 4 to 6 pupils introduced in 1985. This is an integrated subject which includes elements of science, health science, history, geography and civics.

The aim of the subject is to bring about an awareness that man has to live in harmony with his environment in order to ensure the continuous well being and prosperity. This will enable the pupils to function effectively in society, their physical environment and simultaneously be able to nurture personal characteristics which are congruent with the principles of the Rukunegara (National Ideology).

Hence, the subject would be able to provide knowledge, awareness, understanding, appreciation and sensitivity towards the environment. Besides acquiring and nurturing skills to obtain knowledge relating to man and his environment and related issues, the pupils would also be able to understand and solve problems pertaining to the subject.

2. Production of science textbooks

Two divisions in the Ministry of Education play a role in the production of the "Man and the Environment" textbooks, the Curriculum Development Centre (CDC) and the Textbook Bureau (BBT).

The syllabus and the curriculum specifications for Years 4 to 6 were produced by the CDC. Writers were invited to send in sample chapters to be selected by the CDC. One writer was selected to write the Year 4 book for the whole nation and two writers for the Year 5 book. The book for Year 6 was written by CDC.

The BBT handled the technical aspects of the book and the Dewan Bahasa and Pustaka published the books.

The production of secondary science textbooks follow the same procedure as the primary books. Publishers were invited to write sample chapters but this time, about 6-8 books will be selected by a panel of evaluators consisting of lecturers, teachers, CDC officers and other educators. Once chapters and from time to time, the chapters will be upgraded by the same panel of evaluators. This is to ensure that the books maintain a certain quality.

CDC prepares the guidelines for the writers which includes factors to consider in writing the textbooks. For example, writers are supposed to present the subject matter in various ways to make it interesting to the students, facts must be up to date,

illustrations must be proportionate and suitable, sensitive issues to be avoided and so forth.

This procedure was followed to allow a certain standard and uniformity throughout the nation. This is also to ensure that what is needed in the curriculum specification is being translated into the text.

3. Problems faced in producing science textbooks

The most serious problem we face in producing science textbooks is in getting good authors. An author is considered good if he/she is creative and able to make the book interesting to the pupils. The author should be able to capture the attention of the pupils and make them curious about science.

The most serious constraint faced by the authors is time. Very little time is given to them to write (due to some other constraints) and therefore, they are not able to do research before embarking on the job. Resource materials which are up to date are also lacking.

The panel of evaluators who are supposed to analyse and evaluate the books are also not trained to do so. They refer to the curriculum specification to ensure that the contents adhere to what was wanted and the facts are accurate.

Most writers write in the conventional way and do not want to try anything new in case their book is not accepted. Neither do they want to ask any questions during the briefing sessions in case other publishers gain from it. Therefore, we get books that are acceptable for schools but they are not interesting enough.

Part-II

After five years of implementation of the subject "Man and the Environment", it was found that the teachers could not teach this subject very well. Those teachers who are not very well versed with science found it difficult to teach the science elements. Therefore, we find that science is not taught as it should be, i.e. the inquiry way. One of the aims of this subject is to enable the pupils to understand and solve problems pertaining to the environment. In order to solve problems, pupils must be taught to analyze and interpret whatever problems or situations that are presented to them.

In this respect, science books (be it the textbooks or supplementary books) play important roles because they serve as teaching aids and references. If science books are not interesting enough and do not attract the pupils, their curiosity about science cannot be aroused. This in turn will produce a society which has no science and technology culture.

The Training Course

The training course on producing science books for the primary level has given a lot of insight into the situation in Japan and what can be done to improve the production of primary science books in the respective countries. Presentations of the various country reports show that many of the countries in Asia and the Pacific face similar problems and needs with reference to science book production, although its seriousness may differ from one country to the other. This was followed by two workshops using the 'New Participation' method to determine the problems and needs as well as the solutions to the most crucial problem. This method is good in the sense that it allows all the participants to express their views.

Almost all the lectures were very well presented. Most of the lecturers were either writers or editors of various pulishing companies. One aspect that was really impressive was the dedication and professionalism shown by these people in producing science books. A lot of research was conducted either by the writers or editors before a certain book is published. This aspect is lacking in most developing countries.

The most interesting part of the training course was the workshop conducted to produce science books for children. All the participants were asked to produce an 8-page science book on any topic of interest. This exercise was good and found to be useful because it gave the individuals a chance to test their creativity in writing science books for children.

Recommendations

From the lectures and discussions, many points of interest could be considered and

emulated from the Japanese with regards to science books for children. Although we can find a lot of books for children in Malaysia, be it local or foreign, it is quite sad to say that science books for children are still very lacking. More writers could be encouraged by introducing awards for outstanding children's science book writers or establishing a Malaysian society for children's science books to help promote its development.

In Malaysia, there is an association for translators established by the Dewan Bahasa and Pustaka and a number of foreign books (mostly American and English science books) have been translated to the national language but they are mostly academic books for the higher level. Good foreign books for children need to be translated and a pool of translators proficient in English, Japanese, Russian, German, etc. should be encouraged to join the association.

As Prof. Hiroshi Ezawa mentioned in his lecture that what is important in science is to stimulate the imagination of the children. Good books can do just that and if primary teachers can use supplementary science books, for instance picture books and also the 'kamishibai' for children in the science lessons, it would indeed arouse the children's interest in science and stimulate their minds.

As it is now, most of the teachers depend only on the textbooks. The 'Man and the Environment' textbooks are written in an expository form with questions at the end of every chapter. There are no teachers' guides and this makes it difficult for the teachers to conduct the lessons.

Therefore, if it is possible, the textbooks should be reviewed to make them more inquiry-based with lots of activities for the children to develop their intellectual ability and thinking skills. Teachers' guides should also be provided to help the primary teachers teach more effectively.

The Science Unit of the Curriculum Development Centre produces a science news letter called 'Berita Sains' for the secondary science teachers. This magazine is published every four months but the most crucial problem is a lack of articles. Most of the publishers of magazines in Japan plan years ahead on the themes for their magazines and there is good coordination between their editors and writers as well as other personnel. As one of the editors of 'Berita Sains', the next step that should be taken to solve our problem is to plan ahead and get together teachers who can write to make plans for a better publication of the magazine.

At present, our primary schools are not equipped with science laboratories such as the one we saw in a primary school in Tokyo. It may not be feasible to supply equipments to primary schools in Malaysia because this will incur a lot of expenditure. Therefore, some form of guidebook for primary teachers could be produced which contains various innovative ideas on producing simple science apparatus from cheap materials, that teachers or the science society can make.

Malaysia

by Mr. Arshad Rawian
Editor
Children's Book Section
Dewan Bahasa dan Pustaka

Part-I

The production of general science books for children in Malaysia is very limited. Most publishers preferred to publish science textbooks rather than general science books. To produce general science books, they have to face some problems:

1. Problems to get a good manuscripts:

Unlike writing a textbooks (which the contents have been given by the curriculum department), the writers have to determine the scope and contents of the books. They have to select what topics to be highlighted, and how to write efficiently. From my experience, most of the manuscripts sent to my department are not interesting and some are not suitable for the target audience. What we need is not books that just give scientific facts and information, also educate children to understand and appreciate their life and environment.

They have ideas, but failed to develop the idea properly. The informations are not written precisely, and some of them are too

high for the target audience. From my observation, most of the writers have no experience in writing children's books. We have to make heavy editing and guide the writer to make good books. It will take time and increase the cost of production.

2. There are only a few experienced editors for non-fiction, children's books, especially for science books. So far there is no proper training for them.

3. Good illustrations are very important in producing good children's science books. The illustration must be precise, clear and attractive. But it is difficult to find good illustrators. Many of them have only very basic scientific knowledge, and so could not "illustrate" and "simplify" the higher scientific concepts for children.

It is also very difficult to get good photographs for science books. Sometimes the real picture is very important as a supplement to the texts. It broadens the scope of the texts and gives more information to children. Pictures of animals in their natural habitat, for example, are very limited. The publishers have to buy the pictures from other departments and individuals, but the cost is very high.

4. Scientific jargons. Editors often come across a scientific terms which are too difficult for children. To make precise, simple and interesting science books for children is very difficult and needs and experience.

Part-II

For the development of science book publishing in Malaysia, I would make some suggestion plans. These plans are divided into short-term plans and long-term plans.

1. Short-term plans:

a) Organizing seminars and workshops: This program can be held to promote and to train writers, editors, illustrators and other personnel involved in the science book production. Within the program, they could be exposed to the new trend of science books writing, and we could encourage them to write good quality science books.

b) Science books writing competitions: This program can be launched in order to promote and encourage people writing science books. This is the fastest way to get good manuscripts of science books for children. New potential writers and illustrators also could be identified.

c) Translation: Translation of good science books from other countries into local language should be continued. This is also a good and the fast way to get good materials for children.

d) Science book exhibition: Good science books for children could be collected from all over the world, and then could be exhibited to public. The aim of this exhibition is to show many kinds of books to the writers and readers, so that they can learn or get ideas to produce themselves.

2. Long-term plans:

a) Seminars, conventions and workshops on science book production should be organized from time to time.

b) To promote formation of a group of science books writers.

c) To publish science magazines for children.

d) To promote publicity on reading science books through library and mass media.

e) To develop and activate science clubs in schools.

f) Use modern technology, e.g. computer aided design, and desk top publishing to accelerate the production of good science books.

Maldives

by Mr. Hussain Haleem
Teacher Educator
Institute of Teacher Education

Part-I

Republic of Maldives lies in the Indian Ocean approximately 670 km South West of Sri Lanka. Maldivian archipelago of 1,190 coral islands cover an area of around 90,000 square km. Length about 150 km and the widest point being about 120 km. There are 200 inhabited islands which hosts a population of 214,000. Male' the capital has a population of over 56,000. The Maldives is a 100% Muslim country. It has a language of its own developed over the centuries and a script called Thaana in which 95% of the population are literate.

Systematic education in Maldives began in 1927 with the introduction of secondary level schooling in Male'. Arabic, Mathematics, language, poetry and navigation were the main subjects covered. However in 1961 formal English Medium education was introduced in the capital, Male' which has paved the way for the development of modern education in the Maldives. Atoll education system remained the same as 1927 with very little development until the 1980's. When the national curriculum was developed in 1984 need for producing teachers, textbooks and other material were created.

The seven subjects in the national curriculum are English, Mathematics, Islam, Dhivehi, Physical Education, Practical Arts and Environmental Studies. Science is not taught as a subject in the primary classes in Maldives. In the middle school Environmental Studies is divided into Science and Social Studies and is taught as two different subjects.

In the primary classes the Environmental Studies subject is organized in such a way that the Science component is incorporated in it. The syllabus is based on a thematic approach. Starting from himself, leading on to family, island, country, neighboring countries outside world. Within these main themes the science topics are being covered. Life on land and sea, types of soil, sun, moon, solar system, rain cycle, light and heat and many other topics are being incorporated.

Producing of these textbooks also has taken a long time. These books were produced only in the mid years of 1980's. Previously we were using other countries' textbooks such as Primary Science of India, Primary Science of Singapore, etc. Even now in the middle school we are still using the Caribbean Science textbooks.

Hence the need to develop locally suitable textbooks is great in the Maldives. To develop these books for the primary schools we had to face many hardships. The main hardship was lack of manpower resources to write books. Since there were no expert book developers and writers, first we had to train personnel. Within this short period with short term courses, consultants help. As Maldives was depending on expectorate teachers mainly from Sri Lanka and India, needs to create locally able teachers were also generated. Hence teacher training grew formally in the year 1980 and as a separated institution in the year 1984.

Still there are very few local teachers, educators, or even curriculum developers who are capable of undergoing such a task in writing and editing books. This limited staff had to cater for all subject areas with the added burden of training the teachers, acquainting them with the curriculum and to try out the written materials.

Illustrators, lay out makers, those who could do graphics and other art work are also limited in the government sector. Hence a lot of time and finance are also being spent on this area. Limited facilities, financial difficulties and lack of manpower add on to these previous problems.

Printing in Maldives is another serious problem. No single printer (Private or Government) is capable to print all the necessary books. Hence the government has broadened its printing facilities but still most of the books have to be printed abroad. Text books for the next year are already being printed in Malaysia. However I would like to mark the willingness the few capable personnel are showing towards the improvement of producing books.

Private printers also tend to work mainly

for profit. A good example could be the situation in which we are in. These printers are willing to print pupils books and pupils work books which they know that there is a market. Nobody is willing to print teachers' books and hence this has become an added problem.

At present very few science books other than these are being produced, specially at the primary level. However the government is trying hard to improve the condition and is encouraging people to write and publicize all types of reading materials. To help in the limited manpower capabilities I do hope to get a lot of ideas to broaden my knowledge and techniques on how to make interesting and effective primary science books.

Part-II

I would like to identify some of the steps that could be taken with joint co-operation and collaboration of the Ministry of Education Curriculum Development Centre and Institute of Teacher Education. Depending on the national need and education policy of the government some of these steps may not or could not be taken in the near future. Financial difficulties also may restrict some of the recommendations. However if the quality and quantity of locally suitable and usable science materials are to be developed and improved then some of the following recommendations may be helpful.

1) The work of good authors, editors, designers and illustrators seem to be one of the major elements of a good book. Hence the need to develop the manpower necessary is one of the major tasks. To do this the following steps could be taken.

   a) Selected personnel need to be trained abroad, and through these people decentralize the training of these writers, editors, illustrators and designers.

   b) Strengthen the science component in the teacher training institute including the writing, editing illustration and designing of such science materials. This would in turn create interest and develop the scientific knowledge and capability of the graduating teachers.

   c) Incentives should be provided for the people writing science books. These could be in the form of financial assistance, technical assistance, fellowships or scholarships.

2) In order to create good books locally suitable and good reference books and materials are required. The following steps could be taken to overcome some of the difficulties in this respect.

   a) Teachers, writers, editors, students, etc. should get familiarized and acquainted with libraries of the schools, institutions and National Library. Since all these places have a limited variety of books this could be one easy source of reference materials.

   b) More emphasis needs to be given to create or translate the available materials to mother tongue in order to help the students learning in the atolls to have some scientific reading materials.

   c) Organize an exchange programme with regional countries or ACCU member countries. These could be done through the official contact bilaterally or through international organizations.

   d) Selected materials need to be ordered with the financial help of the government or other international organizations.

   e) Contact international organizations such as Asia Foundation, British Council, American Congress for assistance of selected reference materials.

3) Adequate time should be allocated for each process of the book production (textbooks as well as supplementary readers or materials). These concepts should be organized systematically well, in an interesting way, with accurate information which has to be pretested.

4) Field testing and evaluation of the materials should be done in different areas and necessary improvements should be brought within a target time range.

5) After going through the whole ES syllabus, contents for a science kit needs to be identified and these experimental kits for

science has to be ordered and provided to the schools. Without these kits ES could not be taught effectively.

Mongolia

by Nadmidyn Sukhbaatar
Head of Science Book Dept.,
State Publishing House

Part-I

In Mongolia rebuilding and a process of reorganisation of market economics had begun. And it also influenced on our publishing affairs and already several independent have been set up and began to publish and sell books privately and cooperatively. Mongolian State Publishing House publishes scientific-technical, political books, fictions, translations, books for children, text books and manuals.

We publish scientific-technical books as theoretical works, monographs industrial propagations, manuals and scientific popularized works. By the planning of the books designation plan we choose themes regarding the suggestions of the corresponding offices, organisations and authors. Before, this plan was affirmed by the higher offices and it planned for only one years term, but now it has changed and we make direct contracts with the authors.

Also it has a tendency to be changed the designation and structure of books. We had planned and published many titles of thick books, and this method of work had its failure, because of long duration of printing, difficulty in printing and less economical use of paper and materials. So we will try to reduce the pages and sizes of books and to improve illustrations and designs of books. The readers also demand it. It is clear that the knowledge of special branches is very useful for editing scientific books. Because our publishing house publishes different kinds of books and we have not yet specialized publishing houses and editors for specialized books. Therefore we are expecting to have such books edited by the famous scientists of different branches. Before editing the books, editors must be acquainted with other books on the same theme, which will help to improve the contents and structure of our books. I think that the editors must have a deep knowledge of those branches, to find talented authors, choose the most interesting themes for the readers, make advises for the contents and structures of the books and for this purpose must have a close contact with the authors and translators. In our country one of the main difficulties in the publishing of technical books is the technological problem of polygraphy. The old and too large printing facility is unfit for the publishing of science books and manuals for high schools and secondary schools, which we need to publish in small copies. So we are searching the technology and equipments which fit for the publishing of such books. We are starting to alter the technology of all our polygraphies.

There are many problems to be solved in the publishing affairs. So I want to say at last, that I am interested to know many things from the experiences of publishers and editors who are taking part in this course.

Part-II

I learned much about the outline of scientific development in Japan, and the situation of publishing science books for children, magazines and textbooks as well as the problems involved.

In order for children to understand science well and to develop their capability to think scientifically, various kinds of books and magazines on creatures, plants, the earth and the universe have been published in Japan. And they are done on the basis of their observing and knowing about children. These publications serve well to guide the interests of the readers into science. I was especially interested in children's books in which lives of creatures and plants are introduced in different life stages. Such books have not yet been published in Mongolia.

I noticed through observing Japanese textbooks that teaching of scientific method in primary school in Japan differs from that in my country. In Japan, the 'experiment-and-learn' method is valued in order to upgrade children's thinking ability. I understand that

to make children experiment themselves and learn is the fundamental attitude in publishing any kind of books and magazines for children in Japan.

I am not a teacher but, looking at Japanese textbooks from an editor's point of view, I found that they are very thin and present many experiments in photographs, whereas tetbooks in Mongolia have a lot of explanations and are quite bulky. I would like to make a special reference to how all those involved in making textbooks participate and cooperate together in the textbook production process, which is not the case in my country.

It was very helpful to learn how to find themes which can attract the readers' interests and which can appeal to the feelings of all children irrespective of their ages; how to select authors; what kind of responsibility editors and designers have, etc., particularly through the lectures of Mr. Uchida and Mr. Takeda in the course. After I return to Mongolia, I must share this knowledge with my colleagues.

Visiting the editorial office of "Asahi Paso-Con" and seeing the computerized editing system was a very interesting experience for all the participants. Among the participants' countries, there are those where computers are used in publishing and others where they are not. Mongolia is now beginning to adopt computers in publishing work. Therefore, seminars on utilization of computers in publishing are extremely valuable to us.

One of the biggest problems in Mongolia is that of printing. Unfortunately, printing was not particularly dealt with in the course programme this time.

I am sure that the knowledge I gained from the course will be utilized to improve the publishing work in my country. First, I will report on the publishing situation of children's science books, magazines and textbooks of countries in Asia/Pacific to my colleagues and we will exchange our opinions and views. I am planning to start publishing a children's science series in my country, selecting interesting themes in conjunction with the authors.

Myanmar

by Dr. Tin Tun Oo
Writer/Editor/Publisher
Health Education Officer
Department of Health

Part-I

1. Present situation and trends on publishing primary science books

Nowadays book publishing is flourishing all over the world. Many different kinds of books, journals and magazines are published in many different countries. They are the sources of information and knowledge. They also give entertainment to the readers.

Our present life requires much scientific information and knowledge at various spheres of the society.

Present situation of publishing science information and knowledge at various spheres of the society.

Present situation of publishing science books in Myanmar is as follows:

	1988	1989
Total No. of the titles of all books*	1824	2376
No. of the titles of the science books	45	72
Percentage of the titles of the science books	2.47	3.03
Total No. of the copies of all books*(in thousand)	6218	8260
No. of the copies of the science books(in thousand)	150	256
Percentage of the copies of the science books	2.41	3.10

(* = Not including textbooks)
(Science Books contain pure science and applied sciences)

According to the total number of the titles

and the copiés of all books, the publications in Myanmar is increased in 1989.

According to those number and percentage of titles and copies of science books, the publishing science books in Myanmar is in increasing trend.

But the percentage of the titles and the copies of the science books are mostly only 3 percent. It means insufficient science books publication in Myanmar. Major subjects which were published in 1988, 1989 are novels, stories, comic books, and textbooks.

There are only two monthly science magazines; one is purely a science magazine and the other is knowledge magazine including mainly scientific articles. Those all are in Myanma language.

2. Most serious problems and proposed solutions for editing and publishing science books.

Most serious problems in editing and publishing the science books in Myanmar are as follows:

a) Inadequacy of up-to-date scientific information

b) Scarcity of the reference books on science from other countries

c) Difficulties in appropriate translation of modern science terminology

d) Little international experiences in publications

e) Scarcity of high quality papers

f) Inadequacy of modern printing technology

g) Insufficiency of library services

h) Low reading habit of science books among the community

The followings are the proposed solutions for those problems.

a) Increased cooperation and coordination in science publications among Asian and Pacific countries

b) Modernized editing and printing technology

c) Upgrading of the library services

d) Promotion of science books reading habit among the community

Part-II

Our future action plans for development of science book publishing are mainly based on the possible solutions of these problems.

1. Suggestions and proposals

I have a plan to suggest the relevant authorities.

a) to organize the science teachers, writers, editors, illustrators, painters and publishers for proper professional coordination and cooperation.

b) to give the international exposures to the various personnel involved in science book publishing.

c) to modernize the editing and printing technology.

d) to upgrade the library services

e) to encourage science book publishing

2. Own activities

The followings are my future activities based on new ideas and experiences from this training course.

a) I will introduce the progress of Japan in modern science technology and science book publishing to our people by writing, editing and publishing of the articles and the books.

b) To the other writers, editors, painters and publishers, I will explain the activities conducted in Japan for science book publishing.

c) I will distribute the materials produced by ACCU for science book publishing to the relevant departments.

d) To improve in science book publishing, I will mention in appropriate periodicals about the activities of Kodansha Publishing Ltd. which is well organized and firmly established.

e) I will introduce the NP (New Participation) method and utilize it in some decision-making meetings at my office and at other relevant occasions.

f) To improve the reading habit among the community, I will introduce the idea of Bunko (home library) to the people by writing the articles.

In conclusion, the training course has provided me with a lot of precious experiences and knowledge and I hope to cooperate closely with ACCU for more information to improve science book publishing in my country.

Nepal

by Ms. Shubha Lakshmi Pant
Editor
Janak Education Material Centre

Part-I

Primary Textbooks

Prior to 1951, almost all the textbooks and other educational materials were imported from India for use in schools of Nepal. After the establishment of Gorkha (Nepali) Bhasa Prakashini Samiti (now incorporated into Sajha Publication) some books got published in Nepali and some of them were used in Nepalese schools also. The Nepal National Education Planning Commission recommended the need of curriculum in 1954 and subsequently, the Department of Education published primary and lower secondary curriculum in 1958. The private publishers started getting textbooks written on the basis of the curriculum and the government started the selection of textbooks and prescribing them for schools.

In 1961, the Ministry of Education established Educational Materials Centre (now Janak Education Materials Centre, where the author is presently employed) equipped with trained textbook writers and a printing press. Some textbooks were written by these trained writers. The Education press printed the books and they were distributed to schools. The Ministry of Education had the policy of selecting the textbooks from among the available ones on a basis of competition and assigning a specific textbook for the specific district or zones of the country.

The National Education System Plan (1971-76) propounded the following basic policies for the improvement of the quality of textbooks and the distribution.

a) Janak Educational Materials Centre is to be made responsible for publishing textbooks on basic subjects and sample textbooks in other subjects. It should be entrusted with the responsibility of distributing the textbooks throughout the country.

b) The textbooks should be available at fair price and textbooks should be available free of cost to poor children and in the remote areas.

c) Research activities should be encouraged to improve the quality of the textbooks.

At present, Janak Educational Materials Centre holds the total responsibility with regard to the publication and distribution of textbooks for all the levels of school education. Janak Education Materials Centre has its five regional depots from where it distributes books to booksellers. JEMC shares the responsibility of distribution with Sajha Publication which distributes/sells the books on a commission basis.

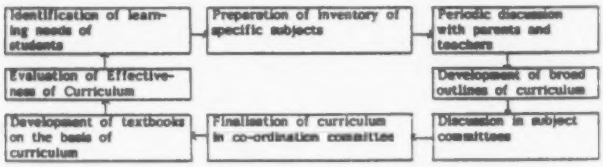
The Curriculum, Textbook and Supervision Development Centre is responsible for getting the textbooks written. It invites manuscripts from local writers and selects the best one on a competitive basis.

Sometimes it commissions some writers of repute to work in certain textbooks. The CTSDC has a regular programme designed for improving the existing textbooks by getting them reviewed by subject teachers and experts. It has started a new policy of putting the textbook for trial use for one year before it is mass produced for use.

Process of Curriculum Development

Since it is necessary that the curriculum be revised from time to time, the Curriculum, Textbook and Supervision Development Centre has adopted a process which ensures a

continuous development and renewal of school curriculum. This process consists of eight steps and is illustrated in the diagram given below:


Identification of learning needs of students
Preparation of inventory of specific subjects
Periodic discussion with parents and teachers
Evaluation of Effectiveness of Curriculum
Development of broad outlines of curriculum
Development of textbooks on the basis of curriculum
Finalisation of curriculum in co-ordination committee
Discussion in subject committees

Problems Faced in Editing and Publishing Science Books

Editing of Science books needs careful consideration as regards to language and diagrams. Photographs, pictures naturally add attraction to primary level children. The size and the correct layout of the figures, diagrams and charts are very crucial in conveying the correct information to students in an interesting way. Lack of modern facilities (such as multi-colour machines, appropriate letter sizes, etc.) has been the constraint in providing a lively textbook. Such a textbook also fails in providing the correct scientific concept in an easily readable way. The know-how of modern technology in publishing science textbooks is also lacking in the country. There is hardly a science magazine suitable for school children. The inclusion of illustrations and diagrams also makes the book expensive. There is a need for publishing a cheap, but attractive, readable science textbooks providing clear science concepts to school children.

Part-II

In the 23rd Training Course organised by ACCU, I got good opportunity to work with honourable and distinguished writers, editors, publishers and illustrators. Their valuable lectures, discussions, practical workshop, observation visit help to acquire and broaden my knowledge and techniques to publish science book in an interesting and effective way. It will be very useful if I could put in practice going back to my country.

Curriculum of a country is guided by Government Policy. So the following suggested recommendation could be put up to the higher authority.

1. To give more facilities on publishing
   a) Science magazine
   b) Science picture books regarding to the primary level
2. To encourage to organize children science club
3. To provide financial resource to schools for science library
4. To input 2-3 credit hour on editing science book in higher level science course
5. To organize training for editor, writer, illustrator and designer and teacher in their relevant fields throughout the country by NP method from time to time
6. To provide sufficient time for writer and up to date supplementary science books and magazine

So this is only a broad frame work within which one can visualize the area that needs further strengthing for concerted action.

Pakistan

by Mr. Jamil Ahmad
Research Officer
Urdu Science Board

Part-I

Book production may be divided mainly into four steps:

1) Script Writing
2) Illustration
3) Production/printing
4) Sale

Script writing for science books requires persons who have master degree in science subjects. Masters of Science in our country do not have full grasp on language and grammar because they had read science in English while the medium of education at primary and secondary level is Urdu. The books written by masters of science must be read and checked by linguistic experts. The need is to train the scientists in writing

scripts of science books which are not only free of language mistakes but also have the mode to attract the attention of reader. This may be done by refresher courses for scientist to write scientific scripts. Although Urdu Science Board is trying to train scientists on script writing, yet such attempts are to be accelerated.

The second step in book production is illustration. With appropriate drawings and diagrams. On primary level science books illustrations and diagrams play an important role to provide visuals on the subject. The problem is that good illustrators in our country do not know the a,b,c of science. They can illustrate the book only in fine artistic manner. So there is a need to train the illustrator in illustrating the scientific matter and script. On the other hand, the printing of coloured photographs for science books in our country are too costly to reach the reader.

The third step in book production is printing the script with illustrations. Science books, in our country, are usually printed in one colour only. Multicolour printing is too expensive, and general reader cannot buy such costly books. Although four to six colour printing units are working in Pakistan yet their speed and cost does not cut down the prices of the books. Usually colour printing is done on mono colour printing units. Another related problem is of paper. Good and fine quality paper for science books in Pakistan is only imported which also increases the cost of the book. If we produce good quality paper in Pakistan, we may increase the production of good science books on cheaper price.

The last and most important problem of sale arises after production. In our country only 10% people can read the books. Out of these ten percent, only a small number is interested in reading science books while others prefer to read books other than science. Moreover, people prefer to buy and eat a cone ice cream rather than to buy and read a book. Also, the system of education does not encourage the student to buy and read, out of course science books. Meanwhile, the most serious situation has arisen within the last ten years due to the influx of video technique which has completely diverted the attention of people. Now people prefer to see video and not read the books. So keeping these problems in mind, it is very difficult to produce and deliver good science books to the public. Yet in Pakistan our institution i.e. Urdu Science Board is doing this job. We not only produce good science books of primary, secondary and higher levels but also sell them. Our sale is increasing each year by more than 15%. We also produce good illustrated science books for laymen and elementary readers to explain them the principals and laws of science and to teach them the fundamental processes of nature.

Pakistan in Asian countries is on the lowest ebb of education. My training in this course, might open a window for better education and in books of low cost, which is our primary need.

Part-II

Before talking about my future plan of action, after returning to the country, for the development of science book publishing in my country, referring to the training course, I want to tell you about the present situation of science book production in Pakistan.

There are so many private publishing companies in Pakistan, but only a few of them publish science books. Among these Feroz Sons in Lahore and Shahkar Book Foundation and Sayyed Qasim Mahmood in Karachi are important.

Shahkar Book Foundation does not publish science books for children or laymen (neo-literate). It only publishes some science magazines and some encyclopedias of science. It means that they only publish high level science matter. Moreover their publications are not so much attractive and not wide spread.

Feroz Sons is basically a general book publisher, but it also published so many science books for children and laymen. Their publications are wide spread and quality of books is very good. But being a private publishing company, prices of its books is too much high.

In government sector there are about 5-6 publishing bodies which only publish science books and do not do other activities for the promotion of science. Among them are:

1) Department of 'Taleef-wa-Tarjama' Karachi University, Karachi
2) Urdu Science College, Karachi
3) Department of 'Taleef-wa-Tarjama' Punjab University, Lahore
4) West Pakistan Urdu Academy, Lahore
5) Urdu Science Board, Lahore

First four publish only high level science books and quality of books of most of them is not so good. Moreover all of them are general book publishing institutions, and none of them is confined only to science books except Urdu Science College, Karachi.

The fifth one Urdu Science Board Lahore is an institution of science book publication not only for children of primary and secondary level but also for neo-literate and laymen. This institution also has two branch offices in Peshawar and Hyderabad.

Urdu Science Board published more than 200 science titles including primary children books, science terminology dictionaries, encyclopedia of chemistry, books on new techniques of science, computer programming, books on different topics of botany, zoology, geology, astronomy, physics, chemistry, mathematics, live stock and printing, etc. Its publications are wide spread and prices are not too high.

Yet this is only a publishing institution and do nothing for promotion of scientific knowledge except book publishing.

My practical plans of action

For the development of science book publishing, my practical plan of action after my return to the country, referring to the training course programmes which gave strong impressions to me are these.

1) Home Libraries (Bunko) impressed me so much. I think this type of libraries play an important role in creating and improving scientific mind in the children. Simple activities associated with this type of libraries create a working mind in the children. Home libraries also promote the reading habit in children, and in this way increases the production of books. So when I return to my country, first of all, I myself open a home library in my locality and in my office and then try to promote this programme throughout the country by writing articles and columns in the newspaper.

2) In the same way science clubs play am important part in the cultivation of creative mind in children. Through this type of bodies children not only learn some practical science work, but they also investigate the solution of some other problems of science. I think this type of science clubs under the guidance of creative mind science teacher activate the process of evolution of science and technology. So returning to my country I try to promote this type of science clubs in every locality through the media of communication. As the starting example I will try myself to run such type of club in my locality and also in my office.

3) Kamishibai (picture story telling) is also a new technique known by me in this course. Although this type of kit is also used in Pakistan, but not for the purpose of scientific picture story telling. I will also try to introduce this technique in my country for the promotion of science and book production, through the mass media.

4) As for more and beautifully coloured science books is concerned, till now this makes the book costly in my country. If paper is of good quality, printing and illustration is very clean and clear, surely the cost of book will increase. So it becomes out of the reach of common people. I will try to keep such type of books as cheep as possible, so that every person can buy it. It is possible if we print some advertisements of book seller, book publishers, paper producers, ink producers or other parties concerned in any step in the process of book production.

5) Writing, editing, publishing and selling of books is a chain process. If there is some sort of non-cooperation between the persons concerned to any step of this process, the whole chain will be broken. So I will try to make this coordination and cooperation as strong as possible, creating the atmosphere of confidence between the writer, editor, publisher and seller. This also is possible, by writing columns and articles in newapapers, by calling meetings and seminars for the persons concerned, and by holding training courses and programmes for the persons concerned.

6) A working coordination between the science book publishing bodies is lacking. I will try my better to make a best coordination between these, so that the production and variety of science books may increase. This also will be done by calling meetings and seminars for the concerned persons in these bodies.

Papua New Guinea

by Mr. Raho Kovau
Curriculum Writer
Ministry of Education

General Background

Papua New Guinea (PNG) is a diverse country both geographically and culturally. It is a mountainous, rugged, tropical country of approximately 3.5 million people of diverse cultures and over 800 different languages, which is more than a quarter of the languages of the world.

Education in Papua New Guinea

The societies of PNG have systems of traditional education by which knowledge, skills and attitudes for each society are passed on. Our technology in agricultural, house building, and sailing are among the most ancient known.

Literacy and formal schooling have much more recent origins. They were first introduced into PNG society by the occupying colonial power to prepare a small number of people to meet the manpower needs of their churches, business and later administration. It took no little cognizance of, and was unrelated to the needs of life in the larger community. Christian mission groups began using vernacular languages and lingua franca for envangelistic purposes around the year 1872. That situation continued up to the end of the Second World War when changing global attitudes to colonisation saw Australia colonial government became involved in primary education. The National Department of Education was established in 1946. In 1950 a policy of universal primary education in English was introduced by the Australian colonial government.

The language and origins of formal education, have always isolated parents and their communities from schools. Until recently the speaking of any language other than English was banned in most schools. Traditional vocational skills and social, spiritual and ethical values were not a valued part of the formal school experience. Contrary to all education theory, the formal education system did not begin with the known. Existing language, number, scientific, social, spiritual and ethical concepts of children are ignored. Formal education has and continues to contribute directly to the alienation of children from their parents and their way of life.

The Education System

Papua New Guinea has built a complete education system within a short period. The country has adopted a four-tiered education system; primary or community (grades 1-6), lower secondary (grades 7-10), upper secondary (grades 11-12) and higher education. Most of the primary schools are constructed by the local community using bush materials. A large number are in very isolated locations where the only means of access is by one, or any combination of air, canoe or walking. The secondary institutions are almost all boarding establishments, constructed of permanent materials and situated in or near to administrative centres.

We now have approximately 2,500 primary schools. Lower secondary education is provided by more than 230 academic, technical and vocational institutions and College of Distance Education. There are 9 upper secondary academic institutions. Primary teachers are trained at 8 teachers colleges. Several provinces and NGOs train teachers for vernacular preparatory classes. Secondary teachers are prepared by the four universities and a host of other tertiary institutions. Most of these operate under the umbrella of the Commission of Higher Education.

Primary Science Education

Brief History of Primary Science

The first major development of the primary science curriculum in Papua New Guinea was a Unicef/Unesco assisted education project

initiated in 1968. This project provided a full-time Unesco science curriculum adviser who was funded for 3 years and who set up a Science Curriculum Development Panel consisting of himself, a number of primary teachers' college lecturers, one primary school head teacher and one primary science teacher from a pilot school.

As a result of this project, the Three Phase Primary Science (TPPS) course was developed. it was designed to help children to understand some of the many new things which were introduced in Papua New Guinea. It introduced teachers and children to the physical sciences. They began to learn about heat, light, electricity, magnetism and other things as well as about animals and plants. They began to learn and experience the scientific way of thinking.

In 1973, the TPPS course was introduced to most schools throughout the country.

Present Situation

A major evaluation of the material produced was carried out in 1977. This evaluation generally supported the material but made several recommendations. In the late seventies, the TPPS course was revised. As a result of the evaluation, the Primary School Science Advisory Committee which consists of teachers' college science lecturers, science curriculum officers from the curriculum unit of the National Department of Education and experienced science teachers, recommended that the original aims, methods and content be maintained while the programme be revised beginning with Phase III.

During the early and mid eighties, new Teachers Guides for each grade from 1-6 were written. A Primary School Science Syllabus with additional support materials were also written. This primary science course was based on the revised and expanded version of the Three Phase Primary Science Course. Most of the original aims, objectives, concepts, and activities remain though in a simpler form which will help teachers who have little scientific training, background or experience. This was to give the teachers the much needed assistance they wanted.

An attempt has been made to reduce the amount of imported materials needed through the use of locally available substitutes. Wherever possible links with traditional practices, methods and experiences have also been strengthened.

Science is a compulsory subject in all of grades 1-6 of the national education system. There are nationally prescribed curricular throughout. Primary school science receives only a small allocation of time; 30 minutes per week in grades 1 and 2, 40 minutes per week in grades 3 and 4, and 60 minutes in grades 5 and 6 out of a total weekly allocation of about 1,650 minutes. In addition, there is a 30 minutes science radio broadcast for grades 5 and 6.

Science is a way of finding out new knowledge by activity and experiment. In primary schools in Papua New Guinea, science education is not a series of explanation of 'why' and 'how' things work. The main aim of the course is to provide children with new experiences.

The major emphasis of all science lessons are on child activity and experience, designed to exposed pupils to a range of science-related experiences with stress on the immediate environment. The lessons are based on the assumption that children learn best by doing things rather than by hearing about them. The broadcasts relate the science concepts introduced in the activities to broader issues and applications. There is also a health programme for community schools and practical work in agriculture is undertaken.

The course includes making careful observations of living things. For example, the children look at plants, animals, rocks, soil, and water. They also become familiar with man-made objects such as mirrors, lenses, magnets and simple electrical apparatus. In grades 1 and 2 the children experience many enjoyable activities not normally available in the home, and are encouraged to talk about these observations and to ask questions. Grade 3 and 4 is a series of simple experiments based on observation. The children are expected to observe accurately and report what they have observed. Grade 5 and 6 science is a series of more formal experiments. These experiments involve comparison, measurement, recording of data, simple graphing, sketching and reporting.

Most importantly, the course is activity-based one. All lessons involve the pupils in some kind of activity designed to help them

form useful concepts. Formal instruction is kept to a minimum. The children are encouraged to learn by doing.

Problems of Editing and Publishing Primary Science Books

In today's world, scientific knowledge is an ever changing process, subsequently, more and more books are written each year about these new information. In light of these changes; the planning, development, and publishing of suitable relevant materials at low cost targeted at primary school children is of paramount importance. In the Papua New Guinea context, the seriousness of the problem lies in the search and identification of good quality suitably relevant materials at low costs for children. If we begin from the world of the children, then science will be relevant to the children. We should discourage work which involves iron filings, tongs, etc. to making of bush trails and measuring leaves. We should use real life materials and situations. This implies that; teachers and children use the local environment as much as possible, rural and urban science courses need to be different, and programming must be done locally by teachers. Further, the relevancy and the suitability of the materials should be reviewed regularly as the need for science and technology is playing an important role in the lives of people.

Generally, while science is seen as an essential core subject throughout the education system, it does not at present receive the emphasis in terms of time allocation which it often does elsewhere. There are a number of reasons for this. The limited science background of community school teachers influences the amount of science that can be attempted at that level. Due to the wide aims of the curriculum at lower secondary level, specialised subjects stressing preparation for the next level, receive low priority. For many years now, primary school science education in Papua New Guinea has been given very little recognition.

As a developing nation, Papua New Guinea's scarce resources and benefits are thinly spread to cover the many developmental areas. Although, the Department of Education gets a larger portion of annual budgetary allocations, the development and publication of science materials for primary schools has been given a very low priority. Other areas of discipline such as English and Mathematics are given priority as these are considered to be important. This is evident in the vast differences in the quality of materials currently in existence.

The Science Office of the Curriculum Unit is entrusted with the important task of planning, designing, and developing primary science books for curriculum implementation. However, these tasks are difficult to achieve because there is a shortage of manpower within the office. Part of this constraint can be attributed to the kind of financial allocations made available to the Science Office. If sufficient funds are made available, more staff would be trained and employed permanently or specialist contracted on temporary basis to develop and produce materials. At the moment, there is a small number of staff available to undertake writing, editing and publishing tasks. This small group of people are expected to develop and produce science materials at grades 1-12 level which is an enourmous task. Currently, the emphasis in science materials development and production has been directed at the secondary level, the primary level has been very much neglected.

In the Papua New Guinea education system, a lot of emphasis is placed on the teaching of English and Mathematics and in many other aspects of the curriculum. In terms of financial support and staffing, these two subject areas have priority unlike Science, Community Life, Health, Agriculture, and Expressive Arts which are way down the priority list. Similarly, the recruiting and contracting of writers to develop and publish materials has always favoured English and Mathematics in terms of numbers. This one-sidedness has resulted in more officers been recruited to develop and publish in the areas of English and Mathematics than Science and other subject areas.

Papua New Guinea like many developing countries is burdened with financial constraints. Under such conditions the development and production of materials in general is given low priority unlike other areas of development. When such situations arise, the quality of science curriculum materials produced is affected. In order to produce quality materials, a lot of money is required and similarly, more time is needed to

attain better standards. Also, the chances of contracting expert writers from within the country or overseas to develop and publish the necessary materials, although expensive, becomes very slim.

Possible Solutions

Science is a way of finding out knowledge through activity and experiment. The effective teaching of science in primary schools goes hand in hand with the development and production of relevant quality science materials. The development and production of these materials is an important element of spreading ideas and knowledge.

Considering the limited resources the country has, primary science developers should consider adapting books to suit local needs or publish new ones to keeps up with the changes. Currently not many science books for primary schools for use by children are being produced. Although, some teachers books have been developed, these seem inadequate. More teachers textbook, resource materials should be produced. The acquisition of scientific knowledge by children is hindered by the lack of sufficient knowledge by the teachers and the lack of provision of good quality appropriate science books for children.

In order to develop and produce good quality appropriate science books, it requires time to develop an integrated plan and coordinated team work. There should be a framework created that encompasses the whole primary science curriculum from grades 1-6. The books must be a unified series covering specified topics in planned sequence to prevent gaps in coverage of any topics. The books should be clear and simple and at the right level. If the books are tough the teachers and children won't use them.

In a developing country such as Papua New Guinea, one of the major problems identified is the lack of scientific training and background knowledge of many teachers. The provision of science books to this effect is important as to help alleviate this problem. This is because the books contain the necessary background information. The science materials (Teachers Guides, Resource Books) provide the teachers with the much needed guidance, ideas, and suggestions in the effective teaching of the primary science course. The teachers are also provided with the overview of the content of the primary science course for each grade. This on the whole improves teachers background knowledge on scientific concepts.

Possibly in the near future, a management system could be designed to enhance a functioning science book provision system. The aspects of the system should help ensure continuity such as staffing, technical assistance and to control and monitor progress. Team publishing by officers from various quarters of the society with complementary skills works best to guarantee the right level for each grade.

It is equally important that primary science books provide concrete and simple scientific knowledge as oppose to abstract and complex knowledge to both the teachers and the children. The provision of science books in this case is important to the teachers because they contain carefully designed guided experiments which enables teachers to teach better the concepts that would facilitate the children acquiring new knowledge.

The whole process of science education should be seen as a bottom-up development of science, rather than a top-down system, that we need to generate; one which begins with the world of the child.

Conclusion

Indeed, the time has arrived when every effort should be made to boost primary science at primary level education. Unless teachers and schools are provided with good quality primary science books in order to understand what science is about and to convey their ideas to children then no amount of money spent on teacher training or superficial in-service courses will create real change within the classroom.

In conclusion, the benefits that a country could enjoy through books are beyond measure because without relevant textbooks the growth of a country's education would be seriously hampered.

Part-II

Some of the practical plan of actions I propose to undertake in this important area of science book development and publishing for

children in primary schools in Papua New Guinea are as follows:

Firstly, it is important to keep in mind that there is a diversity of expertise and experiences of personnel involved in the development and publishing of children's science books. These writers of science books, supplementary readers, teachers guides are teachers, parents, specialists, university lecturers and education supervisors. They work in team rather than individually. Editing, book designs and layout are undertaken by the staff of Curriculum Development Division (CDD) of National Dept. of Education (NDOE). Sometimes subject specialists and outside artists are also available to consider the manuscripts and illustrations. Maintaining the cooperation and consultation among these group of experts professionally is a problem. The action I propose is to encourage the different personnel to unite and harmonize their activities professionally.

Secondly, the CDD has established the Primary Schools Science Review Committee recently. The role of the Committee is to review the entire primary science course. The committee comprises of curriculum writers, science book writers, teachers educators and community representatives. An important task of the committee is to plan the actual development and publication of science books for children. I plan to utilize this opportunity by organizing a workshop for the committee members which I hope to conduct during one of their seminars. I plan to organize the workshop along the similar to the one offered at the ACCU during the 23rd training course. However, the actual design could be modified greatly to suit PNG needs. The New Participation Method could be introduced and utilized during the workshop and other decision making meetings. During the workshop I will share the experiences, ideas and knowledge I gain from the ACCU course. I could highlight the important points and characteristics in various forms of science books for children such as science textbooks, science journals, science picture books, science photo books, etc. The workshop could be a forum where participants could share idea and experience.discuss problems and propose workable solutions.

Thirdly, I would act as a resource person to the Primary School Science Review Committee. I could in collaboration with my superiors offer guidance and provide professional support. This could be in determining the type of materials to be produced and in what form. The age, conditions, and geographical location of the children should be given special attention so as to cater for the target group appropriately and to the fullest. This is considered important because science books cover such wide range as: science textbooks, general picture books, science dictionary, science cartoons, guides for teachers, etc. Moreover, it is difficult to find qualified writers. Specialists in a subject area and teachers cannot always write good textbooks and children's books. In this area, my plan of action would be to identify and bring together a pool of human resources available in the public and private sectors to participate in regular writing workshops. This pool of experts could participate irregular workshops to undertake specific writing tasks in the area of children's science book publishing or discuss issues relating to science education for children.

Fourthly, I would use the defferent ways of communication to foster and promote friendly and professional relationship among the private publishers to cooperate with the CDD and NDOE in the development of science book publishing for children. I could encourage the NDOE to initiate dialogue in informing private publishers of the national plan of the production of science textbooks and children's science books to meet the requirements of the current curriculum. I would also suggest to the NDOE by giving a special subsidy to help some publishing houses to select and distribute good science books to school children.

Fifthly, the mass media could be encouraged to play an important role to campaign for the promotion of science in primary schools. One way of achieving this would be the broadcasting of special programmes by television and radio concerning science and its necessity. Another could be in the publication of book reviews with attractive designs and contents to introduce interesting and readable science books to the public. There could also be an introduction of new publications in TV, radio and periodicals. In addition it could also be suggested to the NDOE to launch a nationwide campaign for the promotion of science in general and science books for children.

Sixthly, I could suggest to the responsible authorities for the professional staff in the science section in particular the writers and illustrators to be given adequate training in their relevant fields from time to time. Such exposure should not only be necessary to new staff but other senior staff to give them enough exposure and to learn new ideas to enable them to produce good quality science books. It would be suggested that such training be made available locally so more people could be sent by having a rotation system.

In conclusion, it is important to state that there are a numerous and various practical plans one can propose. However, how to implement these action plan needs an integrated programme which requires the utmost cooperation, complete dedication and commitment and full support from parents, teachers, trainers, publishers, illustrators, editors, researchers, mass-media, non-government agencies, leaders, as well as government. No matter what the burden is, if we cooperate, it will work. These cooperation and coordination of the action plans are a must. Let's work together more closely to make our society better.

Philippines

by Dr. Lourdes R. Carale (Ms.)
Supervising Education Programme Specialist
Institute for Science and Mathematics Education Department, University of the Philippines

Part-I

Introduction

The importance of the textbook in a developing country like the Philippines cannot be overemphasized. It is the basic learning tool and may be the only reading material available to school children particularly in the small villages or barrios of my country.

The need for textbooks in public schools is met by the government through its National Textbook Project. The project has provided basic textbooks, workbooks, and teacher's manuals to public elementary and secondary schools nationwide, and to date, it has improved the textbook-to-pupil ratio from 1:10 to 1:4. The books are given on a free loan basis to children.

What is the role of private or commercial publishers? They may submit textbooks for use in the National Textbook Project in which case, publishing and printing are carried out by the Instructional Materials Corporation (IMC). To qualify, the publisher's textbook has to be approved by the Textbook Council, after which IMC buys the right to publish and distribute a government edition of the book. Private publishers may also submit their books for approval by the Textbook Council as reference mateials in public schools. These reference books are published and printed by commercial publishers and subsequently sold to the Department of Education, Culture, and Sports (DECS). Lastly, the private sector develops and publishes books to be used by students in private schools which constitutes about 10% of the total student population.

There are instances when IMC commissions the writing of textbooks to curriculum development centers (CDCs), particularly when a major curriculum reform is about to be implemented by DECS. The Institute for Science and Mathematics Education Development of the University of the Philippines, is the designated CDC for science and mathematics. In addition to writing textbooks for the National Textbook Project, our institute is also tapped by a Foundation, the Foundation for the Improvement of Science and Mathematics Education in the Philippines, to develop textbooks for private schools.

Development and Production of Science Textbooks

The developmental process is initiated by the formulation of a rationale, scope and sequence, and objectives on the basis of national goals, needs and interests of students and society, and international developments.

The writing team consisting of subject area specialists with classroom teaching experience, and elementary teachers with special training in science teaching, proceeds to develop an outline and to write the manuscript. The writing team works closely with consultants composed of science educators and subject

matter specialists until the revised materials are ready for trial testing.

Tryout of materials are carried out in schools all over the country for a one-year period, in the case of the National Textbook Project. With regards to the Foundation-commissioned textbooks, tryout is done on a smaller scale and may consist of small groups of children who come to our Institute, as well as classes in cooperating public schools.

Feedbacks from students, teachers, observers, and consultants are utilized by the writing team in revising the materials. After final review by the consultants, the revised materials undergo editorial work, and are then ready for production.

Editorial and production work are taken care of by IMC for the National Textbook Project and by the private publisher for the Foundation-commissioned textbooks.

Problems in Textbook Development and Publishing

For the initial part of this discussion, challenges, rather than problems would be a more appropriate terms to use. These challenges confront the writers, editors, and artists.

- How to effectively communicate ideas using a minimum number of words. Since the textbooks are addressed to children, their language level has to be carefully considered. Sentences must be short, and words must likewise be short and simple. Instead of verbal communication, there should be a liberal use of illustrations.

- How to make the presentation interesting and attractive. The pages in the book must capture and hold the interest of children so they will have a desire to continue reading.
  One way is to make the artwork alive or animated. Action must be observable in the illustrations.
  Situations presented must be close to the children's experience, thus relevant to them.
  Stories, folk tales, and a varied format can all be utilized.

- How to stimulate the reader to interact with the written page. Science learning is an active process, not passive. Thus, the textbook should not merely inform, but should direct pupil activity. Exposition, besides being boring, encourages passive absorption of information. Rather than exposition, the book should encourage the reader to use and hone their thinking skills by answering questions, analyzing and solving problem situations, and interpreting data. Emphasis is on how to think, not what to think.

- How to present scientifically accurate information that considers the level of the child. Writers, editors, and artists must be careful in their presentation of concepts and science ideas. These should be correct and acceptable to the scientific community. At the same time, said concepts and ideas must be within the level of understanding of children.

- How to strike the right balance between local and universal color/situations. The book should utilize national scenery, examples, and experiences but must also expose the reader to situations happening in other parts of the world. The book should be able to expand the child's horizon, so to speak.

Some major problems met by writers, editors, and artists are as follows:

- Delay in meeting deadlines. The problem commonly occurs on the part of writers and artists in view of the creative nature of their task. It is to be recognized that conceptualization and presentation of ideas take time. However, a delay in one stage of development disrupts the entire process. The people concerned should set realistic expectations and an achievable timetable to avoid frayed nerves, ruffled feelings, rising expense, and possible physical illness on the part of people with weak hearts and weak stomachs.

- Short supply of qualified people needed in the different phases of textbook production, i.e.

  - writers with the adequate science background, teaching experience, and the necessary writing style to capture the attention and interest of children;

  - editors who, in addition to being communications experts, are also knowledgeable in science content, pedagogy, and educational psychology;

- artists who are truly imaginative and creative with inherent talent and/or training in making illustrations that appeal to the young; they must also have a grasp of the basic science concepts discussed in the books.

- Conflicts arising among the writers, editors, artists, and the production staff.

It is not uncommon for writers to keep on revising their manuscripts until the very last stage of production, of course, with the intention of coming up with an excellent piece of work. While it is true that rewriting is the secret of good writing, authors must realize when to stop making changes, when to let go of their work.

In some cases, writers are hesitant to accept the suggested changes of the editor because of perceived conceptual errors arising from the changes.

On the part of the editors, some go overboard in their corrections, changing practically everything the author has written to suit the editor's own style. Editors have to exercise care such that the author's ideas are not taken out of context, which may result in an erroneous presentation of concepts. When making revisions of particular approaches to be used by the teacher and classroom activities to be done pupils, recognize the classroom experience and expertise of the writers. In other words, editors must know the point at which they are already impinging on the responsibility that belongs to the writer.

There is a need for artists to work closely with the writers from the time artwork is being conceptualized up to the inking or finalization of the illustrations.

To avoid these conflicts among writers, editors, artists, and production staff, each group in the development process must have a clear idea of each other's particular roles. More importantly, there must be mutual respect for each other's ideas, and a spirit of cooperation and trust in the capabilities of fellow workers.

There are also problems inherent to the technical aspects of textbook production, namely,

- High cost of printing, e.g. in terms of paper and ink. For this reason, books produced in the Philippines use newsprint and are not colored. With the high cost of textbook production, the books are not within the reach of the poor. Most of them can only avail of the free loan extended by the National Textbook Project where the book is shared with other children.

- Lack of trained personnel in the production process. Training and retraining of typesetters, layout artists, and printers have to be undertaken so they can operate up-to-date machines when these become available.

Part-II

PLAN OF ACTION

Although science reading materials production in the Philippines is confined to textbooks and science magazines, the ideas expressed in the course mostly in relation to science books are relevant to what we are doing. For instance, all the sessions emphasized that science reading material should captive and hold the interest of children, and should be presented in an understandable and logical manner, with a liberal use of illustrations. I believe this general rule should be followed whether one is developing and producing a science book, textbook, or magazine.

To share the benefits obtained from the training course, with children, teachers, editors, and writers in the Philippines, I intend to do the following:

1. Recommend a national level seminar workshop in science book development and production to be sponsored by ACCU, jointly with the UNESCO National Commission of the Philippines, and to be organized by UP-ISMED as host institution.

This particular training program will not be exclusively for writers and editors, but will include book designers, illustrators, layout artists, and photographers.

Resource persons, training materials, and other forms of support will be requested from ACCU. Participants will come from various agencies in the Philippines, both public and

private, involved in science book production.

2. Share the experiences of the training course in an informal session with UP-ISMED staff, particularly the members of the elementary science work group.

The work group is presently involved in the development of science textbooks for grades 1 to 6 for use in private schools. It the been commissioned by the Foundation for the Promotion of Science and Technology to undertake this project. Many ideas learned from the present training course can be inputted to the textbook project.

Editors and writers of interested publishing houses, can be invited to attend.

3. Conduct a short-term course of 18-hours duration on science book production. This course will consist mainly of a workshop starting from the preparation of the text, illustrations, layout, and production (following the model used by Dr. Kako.)

Our Institute, UP-ISMED conducts short-term courses for teachers of science and mathematics, and exposure to science book production can form part of our reportoire of courses.

4. Incorporate a workshop on science book production in the one-month training program for elementary science teachers. UP-ISMED has been deligated by the Department of Education, Culture and Sports (DECS) to conduct his in-service training program for the purpose of upgrading the content background and teaching methodology of teachers. Science book production can be an additional component inasmuch as good and qualified teachers can be tapped to write books and textbooks, or at least science modules for use in local community schools and science articles for magazines.

5. Use the N-P method at the start of textbook production or curriculum development, whereby teachers and writers from different parts of the country will be asked to bring out problems encountered in teaching particular science topics, come up with possible solutions, and suggest examples of local real life situations for inclusion in the syllabus/textbooks.

Finally, certain ideas brought out in the training course will have a profound influence on the science materials we are developing, to wit.

a) Do not be in a hurry to teach abstract concepts to children. Content selected should be within the cognitive level of children. For children, the process of finding out, rather than the content, should be emphasized.

b) Regarding superstitions, it might be difficult to touch on them in science books or magazines for the purpose of disproving them because of their large number. Instead, authors can concentrate on how to carry out scientific investigations, and develop a scientific way of thinking.

c) Meeting deadlines is not a problem of publishing houses. Science magazines have a concrete plan way in advance, some for as much as 12 months. In the case of textbooks, the series for 6 grade levels is finished in 2-years time.
(Note: We, in the Philippines, should make it a point to meet deadlines through careful planning.)

d) When arguments/discussions arise among writers, editors, artists, and production staff, they should learn to arrive at a compromise.

e) The use of a variety of format and illustrations including cartoons, realistic drawings, and phtographs, make science books interesting. (Note: Personally, I believe this variety, should be used in textbooks as well, so they will not be a bore.)

f) Usually illustrations rather than photographs are very useful when a composite representation is needed. Photographs, on the other hand, are more convincing when a realistic effect is desired.

by Mr. Bae Yong-pha
Editor
Korean National Commission for Unesco

1. Outline/Introduction

As of 1989, the total number of books published in Korea amounts to 197,224,978 copies of some 38,837 kinds, all of which were published by 5,100 publishers nationwide. Among them, the number of books for children is 40,387,130 copies (some 20%) of 7,976 kinds published by some 500 professional publishers. Considering an elementary school enrollment as of 1989 of about 5,000,000, the average number of books for children (including kindergarten pupils) is 8 copies per child of the total, however, science books for children were only 3.7% at most, or 299 different titles.

In the earliest stage of publication programmes of books for children in Korea foreign publications for children were translated or simply imitated. In recent years, however, books for children have developed rapidly, both qualitatively and quantitatively keeping pace with the nation's high growth in industrial development as well as living, cultural, and educational standards. Such trends appear in the publications' editorial contents, for example, - from basic sciences through the ultramodern including space science, astronomy and the genetic engineering in order to help them meet the rapid changes of contemporary society. In short, publication programmes for children in Korea today are growing rapidly, though there have not yet produced satisfactory results nor enviable profit for their publishers.

2. Major Science Books and Monthlys for Children

Title	Content	Publisher, etc.
Science Chosun	General Science Magazine	Inaugurated in 1933/ stopped publishing
Student's Science	For Elementary & Secondary School Students/Monthly	Daily Hankook Ilbo
Weekly Gwahak Shinmoon		Only Newspaper in this field/Plans to become a Daily soon
Monthly Science	Monthly	Gyeaong-sa publisher
Gwahak Dong-A	Monthly	Daily Dong-A Ilbo
Science & Technology	Monthly magazine/General	Nat'l Federation of Scientific & Technological Organizations

Major Publishers Specializing in Independent Volumes:

Ungjin Publisher	
Audio-Visual Education Co.,	
Kyomoong Publisher	Specializing in complete works
Hallyo Publisher	
Dong-A Publisher	"
Saesung Publisher	"
Gaae World Publisher	Also publishes a monthly
Dae-Il Publisher	
Moon-Gong Sa	
Saesung Idea	Specializing in complete works
Bo Yuk Sa	"
Britanica Korea	
Kumsa Publisher	
St. Paul's Publisher	
Hyungsoondang Publisher	
Sang So Gak Publisher	
Daewoong Publisher	Specializing in complete collections
Soo Seak Publisher	
Ye Ria Dang Publisher	Specializing in complete works
Daegyo Munhwa Publisher	"
Jikyungsa Publisher	"
Kyunsoorae Publisher	"
Bowoosa Publisher	
Children's Literature Publisher	
Minso Publisher	
Hansol Culture Publisher	
Kyungwongak Publisher	
Daeneung Publisher	
Minsungo Publisher	
Kookmoosa Publisher	

3. Present Situation and Future Trends

What are the problems in developing science books for children in Korea today? In short, one can say that science book publishers are pioneers working in adverse conditions. Until 1970, generally speaking, the world of science journalism appeared to be a wasteland. There was not even one general magazine on science, notwithstanding the nation's strong policy on science and technology and the movement to popularize science launched widely at that time. Under such circumstances, several conscientious scientists and science organizations including a daily newspaper have made every effort for the purpose of diffusing/disseminating journalism of science in Korean society. They have greatly contributed to the introduction of enlightened era of science in the country.

In enumerating science books for children, Student's Science published since 1964 by the Hankook Ilbo, one of leading daily newspapers in Korea, has been a most representative monthly magazine targeting elementary and secondary school students. Another influential daily newspaper, Dong-A Ilbo later joined with the publication of Science Dong-A whose

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editorial content includes a variety of color photos and pages in each edition. These two monthly science books for children by two leading daily newspapers also contributed greatly to the development of science book publication programmes by making best use of them as sister magazines. A number of publishers followed suit publishing science books for children, furthering the popularization of science. The nation's rapid industrial progress, too, functioned as an important plus factor and encouragement.

In 1980s as a consequence, numerous science books for children have appeared in book markets throughout the nation, most of which are well printed with attractive color pages and photos, and are likely to help children approach the world of science and nature easily. In the late 1980s, some 500 publishers in this field become fiercely competitive in the book sales market and sales promotion. Analyzing these circumstances, Korea can be described as at the beginning stage of publication activities in science books for children although there are still a number of problems, and current situation is not too satisfactory.

4. Major Problems and Proposed Solutions

In the process of developing science books for children in Korea, there appears, as usual, a number of problems and barriers seriously threatening the spread (expansion) of science book publication despite its bright prospects of the future. Major problems are as follows:

1) Shortage of competent writers/authors/contributors/cartoonists;
2) Shortage of eligible translators of foreign publications in this field;
3) Difficulties in securing editorial professionals in this field;
4) Lack of editorial skills and technologies, i.e., cover design, illustrations, graphics, lay-out and binding, etc.;
5) Financial constraints - higher publication costs and smaller profits compared with other publications;
6) Insufficient opportunities for professional training courses/workshops/meetings, and for exchange of information and materials, etc.

The future of science books for children is, in general, bright. Our contemporary world is changing fast and the global village (i.e. world community) appears very near. Moreover, interest in science is growing rapidly.

Today's publishers and their editorial staff can develop their publication programmes by:

1) Encouraging professional cartoonists of science books,
2) Fostering editorial staff specializing in this field,
3) Strengthening financial support from the government,
4) Training of career/eligible translators,
5) Expanding opportunities for advanced training courses/workshops for editorial staff so as to share their experiences and knowledge,
6) Investing science book development for the future, and
7) Strengthening government's support and related policies including the popularization of science.

All these are the very tasks to be solved in the years ahead.

As for Korea, today's science books for children require more professional editorial techniques and improved contents as well as more attractive formats to have a competitive edge in the flood of books and publications available today. In this way they can contribute to students' learning and admiration of science.

Part-II

In my future editorial work, the following follow-up plans of actions for the development of book producing are expected to be included and further carried out;

1) Dissemination and diffusion of knowledge and information gained during the training course;

2) Making effort to further develop and complete various kinds of methods and ideas which I learned through the training course, to be accorded with the domestic conditions and circumstances;

3) To make every effort to train personnel through sending him/her to training courses and workshops in the field of science book publication;

4) Establishment of a friendly network of 23rd training course participants for the purpose of further prompt exchange of information and materials between participants' countries, and strengthen mutual international friendship; (Chairperson to be according to alphabetical order of nations of all the participants)

5) Closer contact with ACCU in the fields of culture, publication and others for the purpose of not only promoting mutual cooperation but also strengthening friendly relations also because of ACCU staffs' dedicated effort shown in this training course.

In short, it goes without saying that effective utilization of the acquired knowledge and information in my future editorial activities as well as wider dissemination of my experience to the relevant figures and organizations as well in my country are actually the very subjects. Therefore, the following-up plans of actions are to be focused on this. For this, various kinds of meetings, discussions, and consultations concerning science book publishing are expected to be made. At the same time, needless to say, a number of problems and weak points are also expected to be arisen as circumstances and conditions surrounding Asian countries are sometimes quite different from country to country. In this context, ACCU seems to be in a position to initiatively coordinate and improve such situation.

Republic of Korea

by Ms. Lee Soon-duck
Korean Publishers Association

PART - I

The books published last year in Korea is 40,000 titles in number and about 200,000,000 copies in all.

At present there are about 5,100 publishing houses, and each published 8 titles and 40,000 copies in total.

From this number the children's books were published 8,000 titles and 43,000,000 copies in all. It is about 20% of the whole number of published books. This is the second biggest number of the reference books. There is approximately 5,000,000 children who are either in the kindergarten or primary school. That is to say, one child has at least 8 copies. 500 publishing houses out of 5,100 publishing houses are making children books. This is 10% of the whole publishing houses in Korea.

Among these the specialized publishing houses for children books are Woong Jin Publishing Co., Ke Mong Sa, Kum Sung, Hollym, Kuck Min Sue Kwan and Sam Sung. They are publishing books mainly in series. There are also other publishing houses for children, which make books in single edition. Ye Lim Dang, Dae Kyo Moon Wha, Chi Kyng Sa and Kul Su Re are the ones belonging to this category.

Most of the children's books currently published in Korea are on literature and arts, so it is hard to say that there is enough children's books on science. For instance, there are only 300 titles on science out of 8,000 in total. This is just 3.7%.

However, the children's titles have been continually increasing in latest years, and because of social and economic development in the country, not only the grown-ups but children is aware of the importance of the children's science books.

Nowadays the Korean government and the publishing houses have put a great deal of efforts to make good progress on this matter.

At present, the science books for children published in Korea are mainly on the basic science (mathematics, physical) or cosmo-science and astronomy. These books are usually well explained for children. In addition to this, in particular we find the cartoon is very good approach to attract children's attention. This method has been quite successful.

However, there are some problems we are facing at the moment in publishing children's science books.

First of all, most publishing houses trying for more commercial profits have not taken up positive attitude in publishing children's science books. It is because there are some

difficulties in making profits. That is, recovery term of the investment resources is long compared with heavy investment, and there are also some difficulties in increasing copies sold.

Second, the more developed editorial skill is required in publishing children's books.

Especially in designing the cover page this problem is well presented. Whereas the cover page of the general books are well designed, the children books are poor.

Lastly, there are fewer authors in children's science books than in children's literature or biographies. Though they are specialised authors, it is very difficult to write easy and interesting for children's taste.

However, it is hopeful that our life are very much related with science. Therefore, we foresee the development of the children's science books will increase in the future.

For this purpose, it is required training the specialized cartoonists and editors for children's science books and inducing government's investment for science publishing.

Part-II

1. Motivating personnel with high monetary incentives

People who have a talent for writing, illustrating and taking good photographs should be encouraged and motivated by giving high monetary incentives or royalties. Without this people who are able to write and illustrate would not be willing to do the job.

In order to write books for primary children, writers must have teaching experience at the primary level of the primary pupils more than others. Therefore they should be encouraged to write books for primary children with high monetary incentives.

2. Quality of books

There is a need of good quality and affordable books written in popular style using real life situation. Proposed solutions included were as follows: To make science books attractive, there should include many colored illustrations, activities, cartoons, stories and folk tales and other varied presentations in interesting formats on good quality paper.

3. Reading habit

Reading class in school and competition on varied topics among students should be organized and due incentive must be given for the same to sustain children's interest in reading science books.

The solutions suggested above can be carried out effectively if there are no shortage of funds. Publishers should take part in book fairs to attract local and foreign investments. Financial assistance could be sought from the government especially for the small publishers.

Good writers and illustrators alone cannot determine the popularity of the science books among the children. If the general public is not aware of the importance of science, they will not buy science books for children. Therefore, it is very necessary to create a science and technology culture to enable our children to enjoy science books.

Sri Lanka

by Ms. Vimal K. C. Siritunga
Chief Editor
Educational Publications Department

Part-I

Sri Lanka since gaining political independence almost four decades ago, has been relying on the promotion of education as an excellent means for development. The present school system is largely the cumulative outcome of various educational reforms introduced during the last four decades. Introduction of free education scheme from Year 1 up to the University level, the subsequent adoption of mother tongue as the medium of instruction in all schools, and distribution of free textbooks to all students irrespective of their income

groups, are the conspicuous land marks in the country's educational history. The main aim of these reforms was to provide equal educational opportunities to all the children throughout the country.

The expenditure the government has incurred in implementing these reforms has proved to be a success since Sri Lanka over the years has achieved a literacy rate of approximately 90%.

With the introduction of the mother tongue as the medium of instruction, there arose the need for providing text books in Sinhala and Tamil especially for subjects like Science and Mathematics. This was fulfilled with the translation of English books. Similarly the distribution of free textbooks led to the need to produce textbooks at a lower cost. Therefore, in order to fulfill these urgent needs more effectively and efficiently, the production of textbooks from Year 1 to Year 11 was taken over by the State. At present, the Department of Educational Publications under the Ministry of Education, is solely responsible for the writing and publishing of school textbooks both in Sinhala and Tamil.

One of the most significant changes has been the introduction of integrated science and making it a compulsory subject for the Years 7 - 11. In 1985, "Introductory Science" has been introduced as a subject at the primary level in Years 4, 5 and 6.

In Sri Lanka there is a common curriculum for all the schools, developed by a centralized authority and the textbooks are written according to these syllabuses. Writing is done by a panel of writers selected by the Educational Publications Department. This panel consists of experienced teachers of science and officers of the Science Unit in the Department. Writing is done under the guidance of an editorial team headed by a Chief Editor of the Educational Publications Department. The final manuscript is submitted for approval to an Advisory Committee appointed by the Department. This Advisory Committee generally comprises of University Professors, Senior Lecturers, Senior Personnel from the Educational Publications Department and experienced curriculum developers. The illustrations for the text are also done by the illustrators attached to the Educational Publications Department.

A greater percentage of the student population in Sri Lanka comes from the lower income groups. They do not have access to any other reading material especially in science. Therefore, the science textbooks published and issued free by the State remains the only source of knowledge. Thus the need to produce a textbook of high quality is imperative.

In Sri Lanka, the Private Sector too is involved in the publishing of books. Books on science written by private authors are insufficient to cater to the needs of the younger generation. However, in order to promote the production of supplementary readers, assistance is given and incentives are provided to the private authors by the State.

The Library Services Board and the National Book Development Council are two organisations which help the private authors to publish their work with state assistance.

Many resource constraints both human and material, and other problems are encountered especially in the process of producing science books in Sri Lanka. These could be summarized as follows:

(1) The writers as well as editors very often are academically highly qualified. However, except for a few, most of them lack the professional skills of writing and editing science books. They have not been trained professionally and thus lack the writing and editorial expertise required in producing a good science book.

Therefore the available human resources have to be trained and developed by providing them with specific skills in writing, editorial management, production management and even marketing management. Seminars, Workshops and Training Programmes should be organised. Opportunities should be made available by the State for in-service personnel as well as fresh graduates who wish to take book publishing as a career to gain professional training.

(2) Lack of competent illustrators for science books where the illustrations play a vital role in the text.

(3) Limited availability of reference material on production of science books.

(4) Constraints arising out of the lack of sufficient supportive literature in science, leading to a tendency to overload the text with facts.

(5) Constraints arising out of limitations in the indigenous science culture.

(6) Difficulty encountered in giving a local touch to science texts employing local material and processes.

(7) The usage of science technical terms in Sinhala and Tamil, especially at the primary level, makes the text difficult to be understood by the beginners. This is because the technical terms used are outside the common vocabulary.

(8) Difficulty in selecting the form of language to be used at different levels since there is a difference in the written and spoken forms of the language both in Sinhala and Tamil, i.e. whether the spoken form is preferable for the primary levels and written form for the secondary level.

(9) Lack of a graded vocabulary for the science terms. Research in this field should be done either at the university level or at the departmental level.

(10) Constraints on the use of colours because of high production costs. This is a critical draw-back in producing especially books on biology where illustrations play an important part in the text.

(11) Financial constraints in the use of good quality paper which result in illustrations being limited to line diagrams of a single colour.

(12) Inconsistency in the use of science words by the mass media leading to relative confusion in the minds of students.

(13) Field testing and evaluation of the text before printing exists at a very rudimentary level. Information about the effective use and efficiency of a text must be discovered from the real teaching - learning situation in the class room. The comments, critiques or suggestions will be helpful to the editorial staff to renew the manuscript and produce a quality textbook.

Part-II

The following are same of the plans which would be proposed at the department level for action:

(1) To commence on the writing of the text books for Grades 3 and 4 (as no science textbook has been written so far for these two levels). Since the syllabus is already prepared for the introducting science for these two grades, the prescribed topics have to be included in the text. However a suggestion would be made at the departmental level to have a review of the two syllabuses before commencing on the writing of the text. This review committee in addition to the curriculum developers, writers and editors should also include the teachers who are actively involved in the teaching of science in these grades.

(2) Proposal to change the normal form of writing:

a) Writing should change from a content oriented to a more activity oriented form. More activities have to be included to provide opportunity for the students to experiment on their own (as was observed in the primary science class at Yodobashi Daini Primary School). In other words an inquiring type of approach has to be adopted. The activities should be selected and included in the text in such a way that teachers without a scientific background should be able to follow the text.

b) The text should be very illustrative and the illustrations should carry a lot of information to the child. The illustration should compensate the reduction in content material i.e. the visual aspect of the book has to be emphasised.

c) The technical terms should not be introduced at the beginning of a chapter. On the contrary the process has to be explained with the aid of illustrations and subsequently the correct relevant technical term could be introduced if necessary.

d) Reference could be made to the Japanese Science Textbooks that were provided free to all the participants on request. (if translations could be made available.)

(3) A proposal will be made at the departmental level to request the institutions such as the British Council, to provide reference material on science activities for the primary level.

(4) A suggestion will be made to the Department of Educational Publications to initiate a programme for preparing activity-oriented teaching aids such as those materials that had been produced by the ACCU under Asian/Pacific Joint Production Programme of Materials for Neo-Literates in Rural Areas. (AJP) These could be in the form of booklets, posters, games, etc. Such teaching aids will even help the teacher to generate other additional activities on their own.

(5) A proposal will be made at the departmental level to organise an in-service training programme for the writers, and editors who are involved in the writing and editing of the primary science textbooks. A workshop on the same guide lines as that which was organized by the ACCU during the training programme could be organised locally. Due to constraints in available funds, the services of foreign experts on book production may not be possible at the moment. However possible attempts would be made to conduct a workshop on science book production at a national level with the assistance of experts from countries such as Japan.

Thailand

by Mr. Anek Ratpiyapaporn
Educational Officer
Book Development Centre
Ministry of Education

Part-I

Most serious problems in editing and publishing science books

Due to Thailand is agricultural country, in the former time, used manpower for its national production, therefore the people has low awareness in science. The number of general science books, except science textbooks, was unsatisfactory and we had less competition in science books production. But for today the government tries to promote the use of science and technology for developing the country. I do hope the present and new generations of children will be encouraged to be aware of science concept and the trends of science book publishing will also be satisfactory.

However, as being in charge with this work, I have found that some problems rising as the following:

1) Lack of qualified authors of science books: the concept of science is so difficult for children and the presentation of writing is also difficult that few authors can write this kind of book. Besides, texts and illustrations or pictures in science books must be proved correct as the principles of science, so the authors have low inspiration in creating the science books, except scientists who are not good authors for children books.

2) Not only unsatisfactory number of authors, the illustrators of science books are also in small number.

3) Mostly the authors of children books in Thailand are not the professional, but they are lecturers in universities, and their words and presentation are not appropriate for children. This causes the books not attractive and interesting, furthermore it causes difficulties in editorial work.

4) We have small market for science books and some of those books are not interesting for children, and some with good quality are too expensive. Thus the books are not widely spread.

5) Thai children have low reading habit. They read only textbooks. So the government declared the national campaign on the promotion of reading habit and encouraged the children to read general books. They love to read stories and cartoon books. That makes us have to present the books into comic cartoons and scientific stories.

6) As for the problem in editing, some editors who work in government sector which has no its own printing press, have no experiences in printing process, have no ideas to deal with the printers, and with the designers in order to make the books more attractive. They are just only proof readers.

Suggestions for solving the problems

1. To organize training or workshop on editing, publishing and printing for writers.

editors, educational officers and persons concerned to enable them to do their duties correctly and completely.

2. To encourage children and people to be aware of important and advantage of science, then promote them to read science books and utilize what they learn from the books in their daily lives.

3. To give reward and certificate for good writers and publishers in science books for children in order to offer them goodwill towards science book publishing.

4. The local, national or regional seminar/meeting on the production of science books should be organized for providing opportunity for the science books personnels to exchange the experiences and point of views.

Part-II

After I return to Thailand I would like to conduct projects and practical plans of action for development of science books. The plan of the project follows:

Project: Children's science and environment magazine

Background and Information

It is aimed at primary school children of grades 5 and 6, and it has 24 pages, full-colour produced on a bi-monthly basis. The magazine uses an innovation cartoon format in presenting and the most important points in making science and environment magazine. The magazine should be interesting in presentation and content with simple concept on science and environment. Content and language should be suitable for grades 5-6. It's information in a colourful and lively way so as to achieve maximum reader interest. The magazine is used as a supplementary reader in primary school and the magazine not only includes information but also practical projects on the promotion of reading habit and encourage the children to read science books.

Objective of the project

1. To improve awareness among primary school students of science and environment value
2. To promote an attitude in favour of environmental conservation and protection
3. To exhibit this increased awareness and conservation attitude through behavioural change such as through school or community activities
4. To promote students love of reading habit

Steps of the work

1. Collect and study information focused on science and environment for primary school
2. Planning and management of the content, format, illustrations, photographs for science and environment magazine
3. To contact and co-ordinate the writer, illustrators, photographer and publisher
4. Make sure the manuscript is complete
5. Printing and implementation of science and environment magazine to primary school
6. Evaluation of magazine

Time and place

This project will take place from April 1991 - April 1992 at Book Development Center, Dept. of Curriculum and Instruction Development, Bangkok, Thailand.

Thailand

by Ms. Wanpen Sutthagard
Education Officer
Book Development Centre
Ministry of Education

Part-I

The most serious problems in Thailand in producing science books for primary schools are editing and publishing. They can be divided into 2 sections and summarized as follows:

1. Government section: Department of Curriculum and Instruction Development

a) The time spent in holding meeting between scholars. In addition, these meeting did not yield much work.

b) Lack of knowledge and experiences in book production e.g. making layouts.

c) The editors hadn't have full authorities in changing the manuscript. Besides, conflicts between the authors and editors are sometimes inevitable.

d) Lack of illustration from the original objects. In addition, the illustration usually hadn't have sufficient scientific background to convey ideas.

2. Private sector: Only few companies are interested in producing science books for primary schools. Problems in editing and publishing are as following:

a) The theme of the story is inappropriate for children. Most of the authors are specialists who use words that are too tough for children to comprehend.

b) Insufficient scientific knowledge among the editors themselves.

c) Problems in illustration. Most of the pictures are taken from foreign magazines. On the other hand, most of the native artists lack scientific knowledge.

Publication problems

a) The relatively low demand in the market is the main reason of high price for science books for children. Sponsors are needed. Many magazines cannot continue because it could not be non-profitable.

b) Most scientific magazines cannot meet dead-line for circulation. It is too late because some contents are finished but some illustration has not. Many contents are too hard for children. The authors and the illustrator cannot go together.

c) Poor quality of the books produced by some small publishers.

d) The price of science books produced have been controlled by the Ministry of Education.

Part-II

Planning for development of science book publishing

Some major problem in publishing science books for children in Thailand which are similar to those in other developing countries are the lack of qualified and skilled manpower in writing, illustrating, editing and designing, poor quality of science book, ineffective system of book distribution and inadequacy of science book. These problems are on many factors. As a educational officer, without authority for direct changes or improvement for publishing science book I would make suggestions to those who are involved in this field.

By my own activities, I plan to develop the science book publishing in two aspects.

1. Improve production of science books for children, through a committee consisting of scientists, teachers, editors, illustrators, educational officers and designers.

- to improve quality of science books for children. Science books must be printed on high quality paper and colour. Printing techniques must not be neglected.

- to improve style of working. Everybody in the of committee must be met to plan the work at the beginning until final.

- to produce various style of presentation. The style of presentation must be suited for reader and nature of subject.

2. Improve quality of manpower.

- Organizing workshops or training course on producing science books for children.

- to train more good writers, good editors, good designers, good illustrators. The best personnel should be awarded.

- the local, national or regional seminar and meeting on the production of science books should be organized for providing opportunity for the science books personnels to exchange the experiences and point of views.

Suggestions and proposals

1. Improve distribution activity

- The government should be cooperated with private publisher to exhibit the product of science books for children and to promote reading among them.

- The government and private publisher

should utilize search result for book production and the reader's interest. They should provide book shop in all major district throughout the country and improve book distribution system to enable the book to reach everyone.

- The government should provide sufficient budget to publish the book for school throughout the country.

2. Promote the reading habit

- The people in the country should be persuaded to realize an importance of science books. The school libraries should cooperate with school teachers in using science books and reading both for education and recreation purposes.

- The private publishers can help promote reading habit by selling science books to school libraries at a special discount.

- The public libraries should be increased by the government. They should have children to come and conduct a lot of activities.

- The government, a committee of library should conduct seminars and workshops on development of reading habits for the school teachers and parents.

Thailand

by Mr. Sura Damapong
Educational Officer
Book Development Centre
Ministry of Education

Part-I

General situation

In Thailand, six-year primary education is compulsory. Starting from 1991 onwards the current primary school curriculum which has been used since 1978 will be replaced by the revised primary school curriculum. According to the current curriculum, science is not a separate subject but a part of Life Experience subject which includes social studies, science and health education.

The revised curriculum, however, is more conformed to the advanced technology and present circumstances. Science, for example, aims at acquisition of knowledge on nature and environment, scientific skills, abilities to apply scientific and technological knowledge to every day life and deep understanding of relationship between human and environment both naturally and artificially.

All science books for primary students can be divided into 2 types - textbooks and supplementary books or children books.

Textbooks

Only state textbooks are allowed in primary schools according to the policy of the Ministry of Education and the organization in charge of manuscript preparation is Book Development Centre, Department of Curriculum and Instruction Development (DCID). In producing textbooks the DCID department will appoint a committee consisting of university lecturers, supervisors, teachers and the DCID officials to write manuscripts and have them edited before sending to Kurusapha for printing and distribution. All these textbooks are purchased with government budget for students to borrow throughout the semester.

Supplementary books or children books

Presently, there are inadequate supplementary books or children books for primary students to read or study. Organizations responsible for science textbooks for children are both governmental, i.e., Book Development Centre, Department of Curriculum and Instruction Development, and the Institute for the Promotion of Teaching Science and Technology, and private, i.e., publishers numbering about ten. However, bookshops, both small and big, proliferate only in Bangkok and big cities. Not even one emerges in the country.

Problems and proposed solutions

There are four problems in editing and publishing science books for children in Thailand, all of which are interrelated and affected one another.

1. Writers of science books for children lack knowledge and skills in manuscript preparation.

Most writers of science books for primary

students in Thailand have never been trained in textbook writing. They are scholars in science who are interested or motivated or requested to write through self-study from the books available in the markets. Undoubtedly, they lack needed knowledge and techniques in book production and, thus, their works become uninteresting and ineffective. Moreover, they are not widely recognized when appear in the markets. To solve the problem, a practical workshop or training in science textbook production should be arranged for interested writers with an assistance from leading organization in this field particularly the Asian Cutural Centre for Unesco (ACCU).

2. Capable editors are in shortage.

Most editors of science textbooks for children particularly those responsible for private textbooks have never been trained on editorial work. They are mostly graduates in science who are either interested in the work or just want to be employed. Thus, science textbooks edited by those people are ineffective and uninteresting. When appear in the markets, they not only unattract readers, but also discourage them to read other science books.

Studies on production of children books in many universities in Thailand are unsatisfactory because most students have no practical experiences in book production or editorial work except in theoretical exercises. Moreover, when graduation, they find least chance to work in publishing companies. To solve the problem, constant training through the cooperation of government, private and international agencies, particularly ACCU, should be arranged for concerned people in publishing houses.

3. Publishers pay least interest in production of science books.

Publishers of children books in Thailand produce all kinds of books required by the markets. No publishers aim at production of science books in particular. Buyers, mostly parents, try to select most useful books for their children, i.e., those that can develop reading habits and abilities and teach moral ethics in order to lessen parents' burden. Science books with general knowledge do not attract parents because their contents are regarded too far from actual life of children. Thus, publishers are interested to produce books in other fields rather than science. Moreover, production of science book is difficult because it needs expert writers of which numbers are very limited as stated in 1. To solve the problem, different methods should be used to encourage parents and children to realize an importance of science and to read more science books.

4. Distribution of science books is unfavourable in Thailand.

In Thailand, cities are absolutely different from the country. Most people in the country are farmers with low-income who can not afford any books for their children. Thus, children books particularly science books are unavailable in the country but in big cities and the heart of provinces where powers of purchase exist only. This, in turn, leads to the production of unfavourable numbers of science books. To solve the problem, people in the country should be persuaded to realize an importance of books, while publishers are promoted to distribute science books to the country. Parallel with this, small bookshops should be set up in schools or offices with government support to manipulate the books distributed to.

Part-II

This training course programmes gave me many strong impressions, then after I return to my country, I will have new and practical plans of action for developing science book publishing as following:

1. My first impression is the knowledge and capabilities in production of science book for primary students, i.e., textbooks, children books and science magazines that I obtain from the lecturers, from visiting, from sharing and exchanging various experiences with participants from other countries and from the workshop on producing science book for children. This training course programme makes me know the methodology and techniques to make interesting and effective science books and procedures of book production which include manuscript writing, editing, trends on publishing and book promotion.

a) I will arrange a small period to share my knowledge and experiences that I obtained from this training course programme to my office-staff.

b) I will write an article about the methodology and technique to make interesting and effective science book. The article will be printed in the magazine that my department is the owner and will be distributed to primary schools.

c) Planning to share the knowledge and experiences in a) and an article in b) are not enough because in my country not only my office produce the science book but other private publisher produce science books too, so I have a plan to arrange a training course on producing science book in my country. The participants of this training course will be writer, editor, illustrator and translator from government sector and private sector. This training course will not succeed if it will be without kind cooperation of Asian Cultural Centre for Unesco to sent the trainers and lecturers for this training course.

2. The second impression is the science club where children can enjoy studying science through puzzles, handicrafts and experiments.

After I return to my country I plan to do about this impression as following.

a) I will write an article to tell about the science club in Japan and it will be printed in my department's magazine that will be distributed to primary schools.
b) I will contact the organization in Ministry of Education and others that have primary school to involve to their school.

3. The last point is N-P method. This method can bring ideas from every participant. Every participant is important for the group. This method can get the real needs and problem from the participants.

After I return to my country I will use this method in my office, share this method to my office-staff, and I will write an article about this method to disseminate in my country.

by Mr. Nguyen Van Minh
Translator/Journalist
Head of English Section,
Foreign Languages Publishing House

The Vietnamese people are now living in a changing society. Publication in general and publication of primary scientific books in particular, its social activities, have undergone these changes too. While the former may gain some advantages the latter suffers a lot from them. Of course for us Vietnamese renovation is indispensable for the survival of the country and we are in favour of it, and yet the seamy side of this process should be examined carefully in order to find a way to solve it, especially in the field of publishing scientific and technological books.

To get some ideas about this issue, let us take a look at the picture of publication some three years ago. Until 1987 publication like so many others such as housing, health service, etc., were State-Subsidized. By saying "State-subsidized" I mean "paid by the State for the most part." All techno-scientific publications as well as textbooks were sold at dirt-cheap prices, far cheaper than their real costs. All the loss and payment for their compiling, translation, printing, circulation even the cost of paper were settled by the State. Publishing houses did not have to pay attention to the matter of profit or loss at all. What they had to do then was to edit enough the total of titles of books as they had planned early each year with their superior organs, namely their ministries or corresponding bodies. And what they gained went directly to the ministry of finance for the most part and the rest, the small one, to the writers and the printing houses. As for these printing houses, they used the amount of paper supplied to them every year by the State to print the manuscripts given to them by the publishers which would pay all the expenditure needed for their circulation. That sum of money was small in comparison with all the expenses on the maintenance of machines and the pay for workers, etc. The deficit was thus paid by the State. The books that had already been printed and bound at the printing works were returned to the publisher for distribution at very cheap prices. From the organs in charge

of distributing all publications books went to shops at various levels from the central down to the local to serve the reader in general or the public libraries in particular. On the whole, owing to their cheap prices scientific books reached the ordinary reader easily. They could be found in abundance in all libraries, big and small, and were displayed for sale in every bookstore.

But things have changed after the announcement of the policy of cost-accounting business by the State. According to this line all publishers and printing works will have to support themselves financially; no more amount of money will be given to them by the State. These establishments have to earn profit so as to pay for all their expenses including the staffs and workers' wages and salaries and pensions. Publishers of scientific books are now standing at the fork of two roads: either to spread techno-scientific knowledge systematically and rationally with great losses or to edit what can be profitable for their operation in the field of publication to support their own existence without help, regardless of the goals previously put forward to them by the State. At this juncture, the publisher's subsistence comes first. As a result techno-scientific books become more scarce and more expensive (usually five times as high as the 1987 cost). For a common reader, he has to make both ends meet in a hard situation where his income is getting lower and lower in time of inflation. Meanwhile the living cost is increasingly higher, so buying a book ranks last in the list of daily shopping. With the reduction of circulation, books become all the more expensive. The more expensive the book is, the fewer buyers get it. If for some reason a publisher tries to produce something useful in its opinion but not to the liking of the reader, it may be refused by distributors. This leads to a very bad situation: thousands of copies may be piled up in its storehouse, therefore the publisher's fund may lie idle for months even for years. In the meantime money needed for reproduction is unavailable and the staff have no work to do. To the final analysis, scientific books cannot be spread far and wide as before and consequently the ordinary reader's level of techno-scientific knowledge can hardly be improved. Another difficulty for the publisher is that the cost of newsprint is too high, so high that unprofitable manuscripts must wait for their turns indefinitely although they may be very suitable for enhancing the understanding of the masses.

The level of scientific knowledge of the Vietnamese people in general is still rather low. It takes then a lot of time, energy and money to keep abreast with other nations. Therefore, the popularization of techno-scientific knowledge among them is a vital problem. For the sake of this special cause, scientific co-operation with other advanced countries should be taken into consideration. The recent foreign investments and assistance given to us have so far been hopeful for the ailing economy of Vietnam. Nevertheless, a lot should be done for it and the following steps might be useful for the advance of the scientific field of the country:

1. Popularization of scientific knowledge cannot be regarded merely as a profitable business. The publication of primary scientific books must be done steadfastly, no matter how much loss the publisher can suffer;

2. Publishing houses on scientific books should be helped by the State in terms of financial matter so that they may compensate for all the loss on the one hand and improve the living condition of their staff and modernize their equipment on the other;

3. Public libraries should be further invested or freely supplied with scientific publications, especially when they are out of reach of the ordinary reader;

4. Techno-scientific books should be much cheaper as against other publications with a view to encouraging people to buy them, thus making a noticeable contribution to the spread of general techno-scientific knowledge;

5. The fee paid for scientific works by various writers should be further increased so as to stimulate them to write much more for this cause;

6. The system of book distribution, especially that of scientific publications, should be strengthened from central down to local levels so as to smooth over the obstacles in the circulation of basic scientific materials.

Willy-nilly, in Vietnam scientific apprehension should be stepped up, the

scientific revolution must be carried out, scientific achievements must be studied and applied and scientific cooperation should be further promoted. Scientific field should have a worthy place in the life of the Vietnamese people at present and in the future. Only when scientific activities play a major role in the development of Vietnamese society can the people of Vietnam proceed steadily to a promising future on a par with advanced technological countries in the world.

Part-II

My job in the Foreign Languages Publishing House in Hanoi is mainly to edit books or magazines for foreign readers in all fields: cultural, political, sport, scientific, etc. In the field of scientific books alone, what we has done so far is to write booklets to present to Third-World countries, namely those who are having such problems as ours, illiteracy, family planning, sanitary issues in rural or mountainous regions, nutritious foods locally available for the little ones, upbringing of infants in creches and kindergartens, etc. These experiences, we think, are to some extent applicable more or less to them. Of course, we still have to do a lot more in this field, but we also need a balance on editing our publications. So we cannot do as want to. And yet the lessons I have been given here can be of great help to me. With the books that you have generously supplied us I will be in charge of distributing them to relating publishers or institutions so that, I hope, they may have a wider view on what and how they should do for the younger generations. Children in our country lack primary science books to read, contrary to Japanese youngsters who are lucky enough to enjoy what an advanced and affluent society can bring for them, so the responsibility to lead them into the scientific world is still lying heavy on our shoulders. We also understand that to fulfill this task is a matter of decades with a lot of assistance from such countries as Japan on the one hand and with our own efforts, money and time on the other.

Anyhow, I also hope that with the excellent work you have been doing for Japanese children shown to us we could and need do a lot more for our children.

APPENDIX:

(1) General Information

Organization

The Training Course on Producing Primary Science Books - 23rd Training Course on Book Production in Asia and the Pacific is organized by the Asian Cultural Centre for Unesco (ACCU), with assistance from Unesco and with the cooperation of the Japanese National Commission for Unesco, the Japan Book Publishers Association and the Japanese Board on Books for Young People.

Time and Place

The course takes place from 8 November, Thursday, to 27 November, Tuesday, 1990 at the Japan Publishers Building (No.6, Fukuromachi, Shinjuku-ku, Tokyo, 162, Japan) as the main venue.

Background

In order to contribute to book development in Asian/Pacific countries through training of personnel, ACCU has been organizing an annual training course on book production since 1967. The courses in the past dealt with general publishing as well as specific themes such as children's book publishing, periodicals publishing and promotion of reading habits, based on the requests of the participating countries.

The present life requires much scientific information and knowledge at various spheres of the society and the demand and needs to provide interesting and up-to-date science books are growing greater and greater. In view of such situation the Meeting of Experts for Planning Book Development in Asia and the Pacific (Tokyo, 21-25 July 1987) proposed that producing science books focusing on primary science book publishing and scholarly publishing of science books should be taken up as a theme for ACCU's regional training courses.

ACCU, therefore, organizes two consecutive courses on science book publishing, the first year in 1990 on primary science books for children and the second year in 1991 on science books for scholarly level (tentative).

Purpose

The 1990 course will focus on the primary level of science books for children. It aims at providing those engaged in editing primary science books for children including children's books, scientific magazines and textbooks, etc. with an opportunity to acquire and broaden their knowledge and techniques on how to make interesting and effective primary science books, and to exchange experiences and views on their unique publications in respective countries.

This course tries to contribute, through lecture-discussions, practical workshop and observation visits, to the development of science books in the Asian/Pacific region.

Participating Countries

Bangladesh, Bhutan, China, India, Indonesia, Iran, Laos, Malaysia, Maldives, Mongolia, Myanmar, Nepal, Pakistan, Papua New Guinea, Philippines, Republic of Korea, Sri Lanka, Thailand and Viet Nam.

Qualifications of Participants

1. They have engaged themselves in editing primary science books for more than five years.
2. The science books they have actually edited or produced are recognized widely and considered to be most excellent publications maintaining highest standard.
3. They will continue to edit and publish science books in the future and are responsible for developing science books in the country.
4. They are able to report on the present situation of publishing science books in respective countries and participate in the discussions in English.
5. They should agree to observe the course schedule strictly and in its entirety.
6. They are between 25 and 45 years old and

in good health.

7. They have not participated in any annual training course in Tokyo organized by ACCU in the past.

Application Procedure

1. The National Commissions for Unesco desiring to recommend participants in this course are requested to recommend three persons by sending Application Forms duly filled in by each of the applicants to ACCU not later than 6 October 1989.

2. After examining Application Forms, ACCU selects one participant each from the respective countries. (Also up to two persons who attend the course at their own expense are selected, if any.)

3. ACCU informs of the acceptance of participants to the participants themselves and to the National Commissions for Unesco concerned.

* It should be noted that all applications should be submitted through the National Commissions for Unesco concerned, and should reach ACCU by the closing date. Neither direct application from individuals nor application through bodies other than the Unesco National Commissions concerned are acceptable.

Working Language

The working language of the course is English. Simultaneous interpretation between Japanese and English is provided for lectures delivered in Japanese.

Correspondence

Director General
Asian Cultural Centre for Unesco,
6, Fukuromachi, Shinjuku-ku, Tokyo, 162, Japan
cable: ASCULCENTRE TOKYO
fax: +81-3-3269-4510
phone: +81-3-3269-4445, 4435

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(2) List of Participants

BANGLADESH

Mr. Chittaranjan Saha
Managing Director
Muktadhara
74 Farashganz,
Dhaka 1100
Phone: 231374, 235333, 259867

BHUTAN

Ms. Maina Kumari Kharga
Science Curriculum Officer,
Curriculum and Textbook
Development Division,
Department of Education
Thimphu
Phone: 22252

CHINA

Mr. Zhao Zhan Liang
Editor, Biology and Science
Department,
People's Education Press,
55 Sha Tan Hou Street,
Beijing
Phone: 4016633 ext.235

INDIA

Dr. Harish Chand Jain
Reader in Physics,
Regional College of Education,
Ajmer,
305004 Rajasthan

INDONESIA

Mr. Saiful Muzani
Associate Editor
MIZAN Publishing Co.
(residence)
Jl. Empang Tiga 31A,
Pasar Minggu, Jakarta Selatan,
Phone: 7992651

IRAN

Mr. Hossein Daneshfar
Research and Educational
Planning Organization
Ministry of Education
Bldg. No.4, Iranshahr Shomali Ave.
Tehran
Phone: (021) 839261-4 ext. 81

Ms. Tahereh Rastegar *
Science Expert
Research and Educational
Planning Organization
Ministry of Education
Bldg. No.4, Iranshahr Shomali Ave.
Tehran
Phone: (021) 839261-4 ext. 77

LAOS

Mr. Boun Xou Matmanisone
Vice-Chief,
Division for Natural Science
Curriculum and Textbooks
Development for General Education
Research Institute for Educational
Science
Ministry of Education & Sports
Vientiane
Phone: 2726

MALAYSIA

Ms. Azian bt. Tengku Syed Abdullah
Assistant Director
Curriculum Development Centre
Ministry of Education
Persiaran Duta, Off Jln Duta
50605, Kuala Lumpur
Phone: 2541522 ext. 145
Fax: 2541861

Mr. Arshad Rawian*
Editor, Dewan Bahasa dan Pustaka
P.O. Box 10803
Kuala Lumpur, 50926
Phone: 2481011 ext. 137
Fax: 2482726

MALDIVES

Mr. Hussain Haleem
Teacher Educator
Institute for Teacher Education
Han'dhuvaree Higun, Male'
20-01
Phone: 322566, 323172 ext. 227

MYANMAR

Dr. Tin Tun Oo
Health Education Officer,
Central Health Education Bureau,
Department of Health,
36, Theinbyu Street, Yangon
Phone: 31900, 92900 ext.390

MONGOLIA

Mr. Nadmidyn Sukhbaatar
Head, Science Book Dept.
State Publishing House,
28th Post Office,
Ulaanbaatar
Phone: 20231

NEPAL

Ms. Shubha Lakshmi Pant
Editor
Janak Educational Materials Centre,
P.O.Box 1090, Kathmandu
Phone: 6-10160

PAKISTAN

Mr. Jamil Ahmad
Research Officer
Urdu Science Board,
299 - Upper Mall, Lahore
Phone: 878168

PAPUA NEW GUINEA

Mr. Raho Kevau
Curriculum Writer,
Curriculum Development Division,
Dept. of Education,
P.S.A. Haus, P.M.B., P.O. Boroko,
Phone: 246439
Fax: 255902

PHILIPPINES

Dr. Lourdes R. Carale
Supervising Education Program
Specialist
Institute for Science and
Mathematics Education Development,
University of the Philippines,
Vidal Tan Hall, Diliman, Quezon City
Phone: 99-35-45, 98-42-76

REPUBLIC OF KOREA

Mr. Bae Yong-pha
Acting Editor
Korean National Commission for Unesco
50, 2-ka, Myung-dong, Jung-ku
Seoul 100
Phone: 776-2804

Ms. Lee Soun-duck*
Korean Publishers Association
105-2 Sagan-dong, Chongno-ku
Seoul 110-190
Phone: 733-8402
Fax: 738-5414

SRI LANKA

Ms. Vimal Kusuma Chandra Siritunga
Chief Editor,
Educational Publications Dept.
New Secretariat Building
Maligawatta, Colombo 10
Phone 425081, 21872, 29041 ext. 212

THAILAND

Mr. Anek Ratpiyapaporn
Educational Officer,
Book Development Centre
Dept. of Curriculum &
Instruction Development,
Ministry of Education,
Bangkok 10300
Phone: 2817168

Ms. Wanpen Sutthakard*
Educational Officer
Book Development Centre,
Dept. of Curriculum & Instruction
Development,
Ministry of Education
Bangkok 10300
Phone: 2816146, 2828118

Mr. Sura Damapong*
Educational Officer,
Book Development Centre,
Dept. of Curriculum & Instruction
Development,
Ministry of Education,
Bangkok, 10300
Phone: 2816185, 2829318

VIET NAM

Mr. Nguyen Van Minh
Head, English Section,
Foreign Languages Publishing House,
46 Tran Hung Dao St., Hanoi
Phone: 53841

(3) Programme Schedule

8 Nov. 1990, Thursday

10:30	Registration
11:00 - 11:30	Opening ceremony
11:30 - 13:00	Welcome party
13:20 - 13:50	"Introduction to ACCU" (Mr. Sasaoka, Executive Director of ACCU)
13:50 - 14:30	Video show
14:30 - 14:50	Coffee/Tea break
14:50 - 15:50	Course orientation

9 Nov., Friday

9:30 - 12:30	Reports of the participants: "Present situation and problems on primary science books in Asia and the Pacific"
12:30 - 14:00	Lunch
14:00 - 17:00	Reports of the participants: (continued) (Theatregoing: "NOH PLAY" - traditional Japanese theatre)

10 Nov., Saturday

9:30 - 12:30	"Who Has Seen the Atom?" by Prof. Hiroshi Ezawa, Gakushuin University (Theoretical Physics)
12:30 - 14:00	Lunch
15:00 - 17:00	Visit to Suginami Central Library (collection of science books for children) - Introduction to Japanese science books for children by Mr. Hiroshi Tsukahara - My science books for children by Ms. Chie Fujita
11 Nov., Sunday	Holiday

12 Nov., Monday

9:30 - 12:30	"The Roles of Science Books" by Mr. Akihiko Okabe, Science Journalist
12:30 - 14:00	Lunch
14:00 - 17:00	NP-Method discussion & analysis: "Information exchange on science books in Asia/Pacific countries"

13 Nov., Tuesday

9:30 - 12:30	"Photographic Science Books for Children and Science through Picture Story-telling

- looking into life through science books"
by Mr. Tsutomu Okazaki
Editor, Akane Shobo Publishers

12:30 - 14:00 Lunch

14:00 - 17:00 "Two Ideas of Scientific Books for Children"
by Prof. Shoziro Ishii
Professor Emeritus, Kyoto University (Entomology)
and Mr. Takashi Seino, Editor, Kaiseisha Publishers

18:00 - 20:30 Kabuki Play - Traditional Japanese Play & Dance

14 Nov., Wednesday

9:30 - 12:30 'Editing Science Textbooks for Primary School Level"
by Mr. Atsushi Choji
Managing Director, Tokyo Shoseki Pub.

Mr. Wataru Nomachi
Director, Science Section, Tokyo Shoseki Pub.

12:30 - 14:00 Lunch

14:00 - 17:00 "Producing Science Experiment Kits for Children
- Gakken's science journals for different grades"
by Mr. Yasuhiko Uchida
Director of Science Section, Gakushu Kenshusha Pub.)

15 Nov., Thursday

9:30 - 12:30 "Planning, Editing and Publishing 'KAGAKUNO TOMO'
(Science Companion) - a monthly science journal for children"
by Mr. Hideto Takeda
Editor-in-chief, Science Companion, Fukuinkan Shoten

12:30 - 14:00 Lunch by the Director General of ACCU

14:00 - 17:00 "The Roles of Editor in Making Science Picture Books"
by Mr. Kazu Yamada
Editor-in-chief, Science Section, Fukuinkan Shoten

18:00 - 21:00 Friendly gathering with the Group "I in Asia"

16 Nov., Friday

10:15 Leave for Hachioji (University Seminar House)

p.m. Group work:
(1) Introduction of materials of the Asian/Pacific Joint Production Programme of Materials for Neo-literates in Rural Areas in Asia/Pacific

17 Nov., Saturday

a.m. NP-Method Discussion & Analysis:
(2) "How to improve the quality of science books for children in Asia and the Pacific"

p.m.	"Play with Nature" - science activities for children by Ms. Yoriko Nakahira Children's Science Book Writer
	Plenary session: group reports
18 Nov., Sunday	
	Leave University Seminar House for Tokyo
19 Nov., Monday	
9:30 - 12:30	Workshop on Producing Science Books for Children" by Dr. Satoshi Kako . Specialist of Children's Culture
12:30 - 14:00	Lunch
14:00 - 17:00	Workshop (continued)
20 Nov., Tuesday	
9:30 - 16:00	Workshop (continued)
16:00 - 17:00	Plenary session: presentation of works and comments
21 Nov., Wednesday	
10:00 - 12:00	Visit to publishing house (Kodansha) and discussion with science book/journals editors
12:20 - 14:00	Lunch given by Kodansha
15:00	Visit to 'science club' (Wakaba Science Club) Visit to home library (Suzuran Bunko)
22 Nov., Thursday	
10:30	Visit to primary school (Yodobashi Daini Primary School) - science class, laboratory & A-V media
15:00	Visit to National Science Museum (science theatre)
23, 24 & 25 Nov.	
	Observation trip to Kyoto
18:00 - 20:00	Reception by the Japanese Board on Books for Young People (West Japan Branch)
26 Nov., Monday	
15:00 - 17:00	Preparation of individual final reports Observation visit to computerized editing system "Asahi Pasocon"
27 Nov., Tuesday	
10:00 - 12:00	Final discussion
12:15 - 13:45	Closing ceremony & Farewell party

(4) List of Lecturers

Prof. Hiroshi Ezawa

Professor of Theoretical Physics,
Gakushuin University, Tokyo

Born in 1932 in Tokyo. He took B.Sc. and D.Sc. from Univ. of Tokyo. He was Visiting Associate Professor in Univ. of Wisconsin-Milwaukee (USA), Visiting Scientist at the II Institut für Theoretische Physik, Univ. Hamburg (Germany), and Member of the Commission on Mathematical Physics and Intn'l Union of Pure and Applied Physics. His works for juniors include "Who has Seen the Atom?", "Lever and Work", "Fun with Buzzing Tops" and two chapters on relativity in Junior Science Series by Iwanami Shoten. Received Sankei Prize for Books for Juniors in 1977.

*Address: 1-25-5 Honkomagome, Bunkyo-ku, Tokyo 113, Japan

Mr. Akihiko Okabe

Science Journalist

Born in 1929 in Gifu, Japan. Graduated from Faculty of Science, Hokkaido Univ. in 1952 and joined Chuo Koron Pub.. He was editor-in-chief of its science journal "Shizen" (Nature) from 1967 to 1983 and is now a freelance science journalist. Member of the jury for the children's science books award in Japan. His publications include: "Kagakusha Tenbyo" (Sketches of Scientists).

*Address: #202, 17-26 Senzoku 2-chome, Meguro-ku, Tokyo, Japan

Mr. Tsutomu Okazaki

Children's Science Book Editor
Akane Shobo Publishers

He has edited numerous science books for children including "Science Album" series (104 titles), a pioneering photographic science books for children in Japan.

*Address: Akane Shobo Publishers, 3-2-1, Nishi-Kanda, Chiyoda-ku, Tokyo, Japan

Prof. Shoziro Ishii

Professor Emeritus (Entomology),
Kyoto University

Born in 1915. Served as chairman of Entomological Society of Japan and in other important positions including the president of 16th Intn'l Conference of Entomological Society in 1980. His unique researches on cockroach's pheromone and nutrition demands of insects have been highly evaluated world wide. His main publications include "Introduction to Entomology", "Chemistry and Insects", etc. His latest work for children "The Mystery of the Cocoons of the Oriental Moth" received the Akashiko Science Book Award in 1990.

*Address: 1-44, Wakaba, Kukizaki-cho, Inashiki-gun, Ibaraki, 300-12, Japan

Mr. Takashi Seino

Editor, Science Book Section,
Kaiseisha Publishers

*Address: Kaiseisha
3-5, Ichigaya Sadohara-cho,
Shinjuku-ku, Tokyo, 162, Japan

Mr. Atsushi Choji

Managing Director
Tokyo Shoseki Publishers

Since 1957, he is engaged in editing science textbooks for primary, junior and senior high schools. He is responsible for entire editorial operation of textbooks of all the subjects by Tokyo Shoeki.

*Address: Tokyo Shoseki Co.,
1-5-18, Taito, Taito-ku, Tokyo 110, Japan

Mr. Wataru Nomachi

Director, Science Editorial Dept.
Tokyo Shoseki Publishers

Since 1959 he has been editing science textbooks in Tokyo Shoseki. Since 1983 he is director of science textbook dept.

*Address: Tokyo Shoseki Co.,
1-5-18, Taito, Taito-ku, Tokyo
110, Japan

Mr. Yasushige Uchida

Director, Science Editorial Dept.
Gakushu Kenkyusha Publishers
(Gakken)

He has been editing monthly science journals and educational comics since 1963. He was editor-in-chief of monthly journals for different graders of primary school, and also of educational comics.

*Address: Gakushu Kenkyusha Co.,
4-40-5, Kami-ikedai, Ohta-ku,
Tokyo, 145, Japan

Mr. Hideto Takeda

Editor-in-chief of "Science Companion"
Fukuinkan Shoten Publishers

"Kagaku no Tomo" (Science Companion) is one of the leading monthly science journals for children in Japan and they are presented in picture book style. They are generally highly evaluated by librarians and mothers nationwide.

*Address: Fukuinkan Shoten Pub.,
6-6-3, Honkomagome, Bunkyo-ku,
Tokyo, 113, Japan

Mr. Kazu Yamada

Editor-in-chief, Science Section
Fukuinkan Shoten Publishers

He has been engaged in editing many science books for children and in particular he edited unique books of picture dictionary type.

*Address: Fukuinkan Shoten Pub.,
6-6-3, Honkomagome, Bunkyo-ku,
Tokyo, 113, Japan

Dr. Satoshi Kako

Expert on Children's Culture

Born in 1926 in Fukui, Japan. He is one of the leading figures in writing and illustrating children's science books in Japan. He has published numerous picture books mainly on science, stories, and children's folk plays, and they are very popular among children.

*Address: 5-22-4, Kataseyama, Fujisawa-shi,
Kanagawa 251, Japan

(ADVISERS)
Mr. Hiroshi Imamura, President, Kaiseisha
Ms. Yoriko Nakahira, Writer
Ms. Chie Fujita, Writer/Translator
Mr. Hiroshi Nakagawa, Science Book Expert
Mr. Hiroshi Tsukahara, Science Book Expert

(5) List of Secretariat Members

Toshiyuki Hattori, President

Tadashi Inumaru, Director General

Taichi Sasaoka, Executive Director

Akira Moriyama, Director
Book Development Division

Shinji Tajima, Chief
Book Development & Literacy Section

Mieko Tase (Ms.), Deputy Chief
Book Development & Literacy Section

Taeko Kurokawa (Ms.), Assistant Chief
Book Development & Literacy Section

Shigeru Aoyagi, Assistant Chief
Book Development & Literacy Section

Misako Ohnuki (Ms.)
Book Development & Literacy Section

(6) Reference materials

Wakaba Science Club

"Wakaba Science Club" is where children enjoy studying science through puzzles, hadicrafts and experiments. They make a variety of experiments; drinking juice with a 10 meter straw from the top of a building; devicing paper or small wooden boomerangs; flying polyethylene bag ballons using the heat of candles; making molecular models with styrofoam balls.

The owner-teacher, Hiroshi Nakura says, "Here, they can do whatever they are interested in. It draws a line between the club from so called cram-schools." He underlines the enjoyable side of it. But it is not a place just for fun. What makes the club unique is the teaching method, "Kasetsu Jikken Jugyo" (reasoning-experiment teaching method), he uses as a guideline.

"Kasetsu" is a unique method of teaching in which a teacher develops a theme following the procedure, a reasoning, an argument and then an experiment so that it can help children develop their scientific point of view and way of thinking. If the theme is "coins and magnets", for example, a teacher shows children one-yen coins and asks if a magnet attracts them or not. After they choose an answer from "yes", "no" or "others", they start arguing why they choose them. The children will probably make the most of their knowledge and experience to support their points. In this process, they can change their answers. After they settle their reasoning, then an experiment comes. And they can identify the result.

"I knew this method, 'Kasetsu', some twenty years ago which was developed by Kiyonobu Itakura, the head of physical science department of the National Institute for Educational Research. How and why you make up your thoughts is much more important than how much you know. Even if your reasoning is supported by the majority of your friends, it may finally turn out to be wrong, and you can realize that the majority isn't always right. It is like elections in the adult world, isn't it," he laughs. He says he couldn't remember chemical formulas in junior high and was always behind the class in chemistry and science. "Now I study science with children. Life is a mystery" he adds.

Sometimes children bring new ideas. Two years ago, when he saw boomerangs somewhere with the children, one of them, a fifth-grade boy soon brought him a boomerang made of a milk pack, saying "it can fly and come back." The teacher who never thought boomerangs could be made of paper was deeply impressed with his fresh idea.

"Children's school record doesn't directly reflect their abilities. Even if they are behind the class, they can get along well in the society. I hope they gain self-confidence enough to overthrow such false ideas through studying here," he says.

(from a newspaper clip)

Japanese Children's Science Book Centre in Suginami Ward Central Library

The Japanese Children's Science Book Centre was founded at Suginami Ward Central Library (3-40-23 Ogikubo, Suginami-ku, Tokyo 167, Japan)in 1979.

The collection of the Centre is based on the books published during the past two decades, which were donated by the family of the late Akashiko Yoshimura, a founder and the first representative of the Japanese Society for Children's Science Books. In response to the appeal from the Japanese Society for Children's Books at the time, publishers sent newly published books to the Centre. The Japanese Society for Children's Science Books has donated science books for children to the Centre. The Centre houses about 5,000 titles of science books for children, some facsimile editions of children's literature, and some journals on children's literature in 1990.

The Centre is designed for researchers and other interested persons.

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